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Notes on Tuckahoe.

By JOSEPH SCHRENK.

(Plate XLIII.)

For the bibliography, habitat, general appearance and chemical composition of tuckahoe I refer the reader to some editorial remarks appended to a note in Vol. ix., page 125, of the BULLETIN, and to an elaborate paper on "Tuckahoe, or Indian Bread," by Professor J. Howard Gore, in the last Smithsonian Report (for 1881). In regard to the *structure* of this substance, however, I desire to discuss some important points that have not, as yet, received due attention.

The BULLETIN (*l. c.*) says of tuckahoe: " * * * none, large or small, presents *any trace of plant structure.*" (Italics mine.) In the Smithsonian Report, page 695, we find the following passage: "There is not noticeable any membranous division between this bark [*i. e.*, of tuckahoe] and the substance within, *neither does the one merge into the other*, but there is a marked distinction between them. Within we find a compact white mass *without any apparent structure, either vascular or granular.*" (Italics mine.)

A piece of tuckahoe about $8^{cm.}$ in diameter, which I have closely examined, and which, in most particulars, answers the general description of the authors, has, on its rather smooth surface, numerous woody, fibrous, narrow shreds (from 2 to $5^{mm.}$ wide), which run longitudinally along the surface, somewhat like the strips on the trunk of the shag-bark hickory. They are firmly attached to the surface of the tuckahoe, above which they project only about $5^{mm.}$ or even less. A very thin cross-section through one of these shreds, together with a small portion of the adjoining surface, shows that the shred consists of coniferous wood-tissue, which is continued for a short distance into the body of the tuckahoe, below the general level of its surface. Fig. 1 of the accompanying plate, which represents such a cross-section, shows that there is no distinct boundary line between the woody tissue and the inner, white substance, but that the one merges into the other. The cells on the inner, centripetal side, are found in all stages of disintegration; some have small openings in one or several of their side walls, others have lost one or several of their walls entirely, while still others have left no other traces of their existence than isolated, triangular columns, each marking the spot at which three contiguous cells have formerly met. These characteristic cell-remains (in Fig. 1 near the lower margin) are sometimes found quite a distance from the circumference, imbedded in the mass of tuckahoe. I detected them by using indol and sulphuric acid, that most beautiful reagent for lignin.*

* M. Niggl, Das Indol ein Reagenz auf verholzte Zellmembranen. *Flora*, 1881, p. 545 and p. 561.

Another specimen, about 6$^{cm.}$ in diameter, has no shreds on its rough, much wrinkled surface, but has a cylindrical stick, 7$^{mm.}$ in diameter, running centrally through its white mass, in the manner described by the above-mentioned authors, who consider such sticks as the remaining portions of the roots from which the tuckahoe is formed. No cellular tissue could be detected on or near the surface of this specimen; but sections from superficial portions of the central, cylindrical root and the contiguous white mass of tuckahoe displayed the very same gradual merging of the cellular tissue of the woody root into the mass of tuckahoe as described above, this time, of course, in reversed, centrifugal order.

The various stages of disintegration can also be seen in the interior portions of the root itself, for there are many places at which groups of cells, greatly varying in extent, have been partly or entirely destroyed, and replaced by the mass of tuckahoe. (Fig. 6, especially in the lower right-hand corner; also Fig. 7, three cells from *c*, Fig. 6, greatly enlarged.)

These observations seem to prove that tuckahoe does present traces of plant-structure, and also that there is a merging of the cellular tissue of the coniferous root into the mass of tuckahoe; and it is the structure of this latter substance itself that next attracts our attention.

From the above quotations it appears that this mass is thought to be compact and without any structure, either vascular or granular. The microscopical examinations recorded in the Smithsonian Report (pages 698 and 699) do not throw any light on this question; they seem to have been made with the one end in view of proving the fungoid nature of tuckahoe. I find that any section of this mass demonstrates that it consists of countless, minute, white, granular bodies of varying size and most irregular shape. All these granules have rounded outlines, but some are globular, others oblong, either stout or slender, and most of them have short branches, rounded excrescences or tubercles, which give them a very odd appearance. Not only the mass of tuckahoe proper is formed of these grains, but they are found crowding the cavities of the wood-cells described above and figured in the plate. (See Figs. 1, 5, 7 and 8.)

Perhaps it was these bodies on which the following description was based (Smithsonian Report, page 698): "The body of the fungus [*i. e.*, tuckahoe] is composed of short irregularly-jointed threads of mycelium, somewhat tuberculated, which swell considerably on heating with water." That these grains are not mycelium is evident from their very appearance, and still more so from their chemical composition. Potassium hydrate easily dissolves them, while the real mycelium, to be spoken of hereafter, remains nearly unchanged. They are also soluble in cuprammonia, causing a very copious precipitate of what I suppose to be pectate of copper. These characteristic pectin reactions* seem to leave no doubt that these granules constitute the bulk of *pectose* of which, according to all chemical authori-

* Kabsch, in Poulsen's Bot. Micro-Chemistry, translated by Prof. Wm. Trelease (S. E. Cassino, 1883), a book that cannot be too highly recommended to all students of histology.

ties, tuckahoe contains so large a percentage (from 64 per cent., R. T. Brown, to 78.4 per cent., Department of Agriculture.)

Quite distinct from these pectin bodies or grains—as I shall call them hereafter—are the *hyphæ* of some species of fungus that are found in tuckahoe. In the specimens examined, the hyphæ form a dense mycelium at and near the surface (Figs. 1, 2, 3 and 4), and also at all places where the white mass of tuckahoe shows the smallest fissures or cracks. Wherever the mass of pectin granules is compact and uninterrupted the hyphæ are either not seen at all or only very sparingly; nor could I detect any within the tissue of the central root (Figs. 6, 7 and 8). The wood-cells of the outer "bark," however, contain the hyphæ in great abundance, some, especially those nearest the surface (Figs. 1 and 4), to the exclusion of the pectose grains. The farther we proceed toward the centre, the more we find the pectin grains preponderate, until the hyphæ disappear nearly altogether. The same conditions can be observed in the interior, where each of the numerous cracks forms a sort of bed or channel for the mycelium, which sends its hyphæ right and left into the mass of granules.

Sometimes we detect the end of a hypha attached to one of the grains, either superficially (Fig. 9*a*), or entering it (Fig. 9*b*), but I have not been able to find any spores or organs of fructification.

It seems to me that too much stress has been laid on the occurrence of a fungus in tuckahoe, and that no attention has been paid to the essential difference in the substance of the fungus (fungus cellulose), and of the granular bodies (pectose). This neglect accounts for the inconsistencies contained in the latest hypothesis (Smithsonian Report pp. 695 and 697) attempting to explain the formation of tuckahoe: "These spores [found in tuckahoe] have the property of converting the woody fibre of the root into their own substance;" and, "It [*i.e.*, tuckahoe] gradually grows in this manner, appropriating the bark of the root for its own covering, until it becomes too large, during which process it forms a bark of its own, as already described." If the "spores" (*pars pro toto*, I presume) did transform the root into their own substance, we should not find *pectose* in so large a proportion, and the "bark" of the tuckahoe is nothing distinct in itself, but simply a very dense layer of mycelium either with or without a zone of peripheral cells of the tree-root within which the tuckahoe has been formed.

While studying this subject I could not help comparing the formation of tuckahoe with that secretion of the various resins and gums which is known as resinosis and gummosis.* The gums in particular present many chemical and structural similarities to tuckahoe. They contain great quantities of pectose,† and many chemists think that pectose is, in fact, nothing but metaarabin.‡ Mohl,§ Wigand,‖

*A. B. Frank, Die Krankheiten der Pflanzen, p. 75 and p. 85.

†Husemann, Pflanzenstoffe, Vol. i. (1882), p. 168.

‡W. Behrens, Hilfsbuch mikrosk. Untersuchungen (1883), p. 315.

§ *Bot. Zeitung* (1857), p. 33.

‖ Pringsheim's *Jahrb.*, Vol. iii., p. 115.

Karsten,* Frank‡ and Hofmeister§ have shown that the cell-walls within which gum is deposited disintegrate during the process of secretion, thus furnishing material for the latter. But both Hofmeister and Frank think that the gum begins to be formed in the cells before their disintegration commences, otherwise the large amount of the product could not be explained. Frank‖ gives a figure of a transverse section through a branch of a cherry-tree affected with gummosis, which in several respects very much resembles Fig. 6 of our plate. The same author has another figure¶ of a whole branch, a considerable portion of which has been changed into the gummous substance, and which could very well be compared to Fig. 1 of the plates in the Smithsonian Report representing a root encircled with a mass of tuckahoe.

Gummosis (and, to a certain extent, resinosis) is thought to be a process of degeneration accompanying the gradual cessation of the vital functions of some portion of a plant. An accumulation of plastic material takes place in the affected parts, and these are gradually absorbed and finally entirely destroyed. The causes of this process are chiefly mechanical injuries, *e.g.*, the breaking off of branches, the tearing off or bruising of the bark, etc.; but various other causes that tend to diminish or destroy the vital energy of some organ or of the entire plant may produce the same effect.

I have somewhat digressed from my subject, because it is my opinion that a close comparison of the nature and origin of the gums with those of tuckahoe will reveal many analogies which might entitle us to call the pathological process of which tuckahoe most likely is the result, *pectosis*. In that case the views of Rev. M. J. Berkeley and other mycologists (see BULLETIN, *l. c.*) would no longer be mere conjectures. It is not even necessary to assume with Currey and Keller (*l.c.*) that the fungus found in tuckahoe is the cause of its formation. As this fungus has not yet been proved to be *parasitic* on or in the living root-cells, while we have seen that it grows on the pectin granules, we might, with good reason, consider it a *saprophyte*, like hosts of its kind that thrive on disorganizing vegetable or animal substances. However, it remains very much to be desired that some competent mycologist should take this fungus in hand and throw full light upon its life-history, thereby at the same time solving the "puzzle" called tuckahoe.

EXPLANATION OF PLATE XLIII.—Fig. 1. Transverse section from the surface or "bark" of tuckahoe, magnified x 140. The large cells and cell-fragments belong to the projecting shreds of woody fibres, the small circles and corresponding parallel lines represent the hyphæ (transversely and longitudinally); the larger rounded bodies are pectin granules. Fig. 2. Radial section from the same part as Fig. 1, x 140. The cells show the characteristic bordered pits of coniferous wood, also the striation of the disintegrating walls; the edges are not so sharply defined as repre-

* *Bot. Zeitung*, 1857, p. 319.

‡ Pringsheim's *Jahrb.*, Vol. v., p. 25.

§ Pflanzenzelle, p. 234.

‖ Die Krankheiten der Pflanzen, p. 85.

¶ *Ibid.*, p. 90.

sented in the figure, but eroded and of unequal thickness, especially those on the right, toward the centre. Mycelium and pectin bodies as in Fig. 1. Fig. 3. Tangential section corresponding to Figs. 1 and 2, x 140. The ellipses indicate the former position of the absorbed medullary rays. Fig. 4. Tangential section of one of the outermost cells of Fig. 1., x 500, showing mycelium and bordered pits in cellwall. Fig. 5. One of the cells of Fig., 1 magnified x 300. Fig. 6. Cross-section from central root x 140. The large, irregular, empty space on the right, as well as all the cells, were filled with pectin granules, as shown in Fig 7, which represents the group of three cells at *c* in Fig. 6 magnified x 700. Fig. 8. Radial section of a similar cell x 700.—Somewhat higher powers than those given were used in drawing the hyphæ and pectin bodies of Figs. 1 to 5.

New North American Grasses.

By F. Lamson Scribner.

Bouteloua trifida, Thurber, Gram. Mex. Bound. Survey, ined. —Perennial, 6–15 in. high, tufted and geniculate at the base; leaves 2 in. or less long, very narrow and usually involute, strigose-scabrous above and more or less rigid; spikes 3 to 6, pectinately many-flowered .5–1 in. long, erect or slightly spreading on short hairy pedicels; spikelets (including setæ) 3–4 lines long; outer glumes unequal, the upper and larger one about 2 lines long, both smooth, unequally 2-toothed and short awned; flowering-glume, exclusive of awns, about 1 line long, smooth or sparsely pilose, especially near the margins above; pedicel of the sterile floret smooth, bearing three awns, which equal those of the flowering-glume.

Texas and New Mexico; G. R. Vasey. Mexico; Dr. E. Palmer, No. 1,355, 1880. Dr. Palmer's specimens are taller, slenderer and more leafy than those from Texas and New Mexico. The latter have the base of the culms densely clothed with inflated sheaths that are tipped with short mucro-like leaves; the upper leaf also is much reduced, frequently not over a line in length.

This species is closely allied to the next, but is readily distinguished by its nearly smooth flowering-glume and longer and more slender awns.

Bouteloua Burkii, *n. sp.*—Culms slender, tufted, 4-6 in. high, erect or geniculate below, smooth or finely glandular-pubescent; leaves divergent, short, the upper .5 in. or less long, narrow and involute, smooth or, with the sheaths, glandular-pubescent, often with a few scattered longer hairs; spikes 3–5, about .5 in. long, pectinately many-flowered, erect or ascending; spikelets, including setæ, a little over 2 lines long; outer glumes ovate, smooth, nearly equal, the upper about a line in length, both usually very short awned just below the unequally bifid tip; flowering-glume, exclusive of the three continuous and equal awns, less than a line long, pilose with stiff hairs on the back and margins below; pedicel of rudiment .5 line long, smooth, bearing three equal and minutely scabrous awns 2.5 lines long, which are more or less enlarged and flattened near the base.

Laredo, Texas; Mrs. Anna B. Nickles; communicated to me by Mr. Isaac Burk of Philadelphia, for whom the species is named. Sandy plains, Upper Concho, West Texas; J. Reverchon; =No. 3,440* Curtiss's Distribution North American Plants.

BOUTELOUA HAVARDI, Vasey, *in lit.*—"(Section Atheropogon). Culms 10–15 in. high; lower leaves numerous, flat, rigid, 3–6 in. long, 1–2 lines wide, more or less pubescent on the margins below and on the sheaths, upper leaves short (1–2 in.); ligule a ciliate line; panicle 2–3 in. long, erect, composed of 5 or 6 approximate short spikes of about 10, crowded, erect 1-flowered spikelets; outer glumes lanceolate, the lower nearly as long as the flower, the upper, half as long; flowering-glume 2.5 lines long, broad-oval, 3-lobed, the lobes extending nearly half way down, the lateral ones becoming somewhat recurved; palet as long as its glume, narrow, with two stout recurved teeth at the apex; sterile flower longer than the perfect one, the pedicel 1 line long, the three awns each 4 lines, the middle one membraneous-margined nearly to the apex. The crowded rhachis and outer glumes, as also the back of the flowering-glume and palet, clothed with long villous hairs.

"Discovered in the Limpia Mts. of Western Texas by Dr. V. Havard, U. S. A., for whom it is named." (Geo. Vasey.)

BOUTELOUA PUSILLA, Vasey, ined.—Perennial(?), 2 to 3 inches high; leaves smooth, very narrow and involute, the upper an inch long; spikes solitary, pectinately 10–15-flowered, about .5 inch in length; rhachis smooth; spikelets (including setæ) about 2 lines long, outer glumes smooth, the upper broadly lanceolate, 1.5 line long; twice the length of the unequally 1-nerved lower one; flowering-glume very hairy at the base and on the lateral and middle nerves below, the long middle lobe 2-cleft, the stout central seta a line long, exceeding the two lateral ones; palet very broad, and longer than its glume; pedicel of sterile floret .5 line long, with a tuft of hairs at the top, and bearing two or three rudimentary, hooded glumes or scales and three equal awns exceeding a line in length.

New Mexico; G. R. Vasey, 1881.

TRISETUM HALLII, *n. sp.*—Culms slender, 6–18 in. high, smooth; leaves flat, a line or less wide; minutely scabrous, involute near the tip; panicle contracted, 2–4 in. long, the erect and densely flowered branches an inch or less long; spikelet about 2.5 lines long, 2–3-flowered, the nearly smooth rhachis prolonged above the upper floret, and often bearing a slender hair-like awn; outer glumes about 1.5 line long, equal in length, obtuse, the lower narrowly oblong, 3-nerved, the upper much broader and 5-nerved, nerves prominent, aculeate-scabrous, the lateral ones terminating below the scarious margin, which is finely ciliate on the edge; the first flowering-glume 1.5–2 lines long, tuberculate-roughened on the back and scabrous near the tip, terminating in two acute teeth and bearing a scabrous, straight awn a line long, teeth of the second and third florets prolonged into slender setæ less than a line in length, awn longer, twisted below and bent near the middle; palea about two-thirds as long as its glume; grain smooth, about 1 line long.

Named for the late Elihu Hall, in whose Texan collection (1872) it was distributed under No. 799, mixed with *Trisetum elongatum*, Kth. (*T. interruptum*, Buckley; No. 3,546* of Curtiss's Distribution of 1883) to which it is closely allied and which it much resembles in habit, but from which it differs essentially in its broader and obtuse

outer glumes, and in having the lowest awn straight and shorter than the others. Brazos County, Texas; G. C. Nealley, 1883.

A New Grass.

By Geo. Vasey.

Ammophila Curtissii.—Culms 3 to 6 feet high, from a strong, perennial rhizoma, growing singly or in small tufts; base of the culm clothed with the rigid, imbricated, 2-ranked sheaths, above the base 3 or 4 distant leaves, the sheaths shorter than the internodes, very smooth, firm, the ligule an obscure, ciliate ring, the blade becoming involute and setaceous, 4 to 12 inches long.

Panicle 8 to 10 inches long, narrow and strict, the rhachis roughish, the branches very numerous, single, or in pairs below; erect, loosely flowered, sub-divided nearly to the base, the lower ones two to three inches long. Spikelets short-pedicelled, 2 to 2.25 lines long; the outer glumes unequal, keeled, nerveless, the lower one ovate, obtuse, half to two-thirds as long as the upper, which is two lines long, barely acute; the flowering-glume and its palet of similar texture and equal length, slightly longer than the larger outer glume, obtuse or acutish, strongly ciliate on the keel of the flowering-glume and on the two keels of the palet, the basal hairs scant and about one-third as long as the flower.

This was distributed in 1879 by Mr. A. H. Curtiss as *Calamagrostis brevipilis* (now *Ammophila brevipilis*), from which it differs in its greater size, its longer involute leaves, and its much longer and narrower panicle, with the branches sub-divided and flowering nearly to the base; the flowers are very similar, but differ notably in the latter having a ring of very short hairs at the base of the outer glumes beside those at the base of the flowers.

Collected by Mr. A. H. Curtiss on the Indian River, Florida, and to him I take pleasure in dedicating the species.

The Pteridophyta of Litchfield Co., Ct.—During the past three summers I have spent a portion of my vacation in Litchfield County, Ct., and am able to report a considerable fern list, with a few new stations for some species. Most of my collecting has been confined to the towns of Cornwall and Goshen, extending once to Bantam Lake, where the extremely local *Marsilia quadrifolia* is found, and once to Salisbury and northward along the mountains of S. W. Massachusetts. In the list, C stands for Cornwall for species not found in Goshen, and S for Salisbury.

Equisetaceæ.—*Equisetum arvense*, L., *E. sylvaticum*, L., *E. hiemale*, L. (3).

Ophioglossaceæ.—*Ophioglossum vulgatum*, L., *Botrychium simplex*, Hitch., *B. ternatum*, Swz., *B. lanceolatum*, Angs., *B. Virginianum*, Swz. (5).

I have never found *B. lanceolatum* elsewhere except with its congener *B. matricariæfolium*. Diligent search here failed to reveal it. *B. simplex* is probably new to the State.

Filices.—*Polypodium vulgare*, L., *Adiantum pedatum*, L., *Pteris aquilina*, L., *Asplenium ebeneum*, Ait., *A. Trichomanes*, L. (S), *A.*

thelypteroides, Michx., *A. filixfœmina*, Bernh., *Camptosorus rhizophyllus*, Link., *Phegopteris polypodioides*, Fée (C), *P. hexagonoptera*, Fée, *P. Dryopteris*, Fée, *Aspidium acrostichoides*, Swz., *A. Noveboracense*, Swz., *A. Thelypteris*, Swz., *A. cristatum*, Swz., *A. marginale*, Swz., *A. spinulosum*, Swz., *Cystopteris bulbifera*, Bernh. (S), *C. fragilis*, Bernh., *Onoclea sensibilis*, L., *O. Struthiopteris*, Hoffm., *Woodsia Ilvensis*, R. Br.,* *W. obtusa*, Torr., *Dicksonia pilosiuscula*, Willd., *Osmunda regalis*, L., *O. Claytoniana*, L., *O. cinnamomea*, L. (27).

MARSILIACEÆ.—*Marsilia quadrifolia*, L. Bantam Lake and Tyler Pond, where it was transplanted by Dr. T. F. Allen and myself in 1881. (1).

LYCOPODIACEÆ.—*Lycopodium lucidulum*, Michx., *L. dendroideum*, Michx., *L. clavatum*, L., *L. complanatum*, L. (4).

SELAGINELLACEÆ. — *Selaginella rupestris*, Spring., *S. apus*, Spring. (2).

ISOETACEÆ.—*Isoetes echinospora*, Durieu, var. *Braunii*, Engelm. Tyler Pond, common. I believe this species has never before been reported from Connecticut. (1).—Total, 43.

During each of the three years I have found the so-called var. *obtusilobata* of *Onoclea sensibilis* growing in the same locality under conditions identical with those noted by me in this journal for September, 1881. I am more fully convinced that the explanation there given was sufficient to account for the variation in this locality.

I have also the pleasure of recording "Tamarack Swamp," near Syracuse, N. Y., as a new locality for *Botrychium simplex*, Hitch.

Syracuse University, Jan., 1884. LUCIEN M. UNDERWOOD.

The Involucre in Malvaceæ.—Referring to Prof. W. W. Bailey's statement in the BULLETIN for December, 1883, that a greenhouse specimen of *Abutilon* had been found with traces of an involucre, I am happy to be able to say that a 3-leaved involucre is normally present in the young flowers of the common velvet-leaf (*A. Avicennæ*) and also in the greenhouse species, *A. vexillarium* (one of the bractlets long, the others short.) These facts, taken along with the presence generally of a hypocalycine node in the 'non-involucrate' Malvaceæ, suggest that the distinction between them and their involucrate allies is unwarranted, the real distinction being that in some the involucre is fugacious. In some of the genera there are difficulties in the way of verifying this view, arising chiefly from the bristly character of the young flower-buds.

Princeton, N. J. G. MACLOSKIE.

Notes from Massachusetts.—At one of the field meetings of the Essex Institute, held at Groveland, Mass., several plants were reported as having appeared there, the seeds doubtless having been introduced from the West in wool or in grain and other seeds. Of those mentioned there were *Linum usitatissimum*, *Pentstemon Digitalis*, *Lythrum alatum* and *Verbascum Blattaria*. The same *Pentstemon*

* *W. Ilvensis* can hardly be ranked here, as I found it near Sage's Ravine not more than one-eighth of a mile over the Massachusetts line. It is doubtless found on the brows of the same range of hills extending southward into Litchfield Co.

and *Houstonia purpurea* have been found at Boxford, *Cynoglossum officinale* at Topsfield, and *Verbascum Blattaria*, *Echium vulgare* and *Trifolium stoloniferum* at Georgetown.

We found on the field day above mentioned *Campanula rotundifolia* with double flowers.

Georgetown, Mass. C. N. S. HORNER.

Helonias bullata in Cultivation.—It has been claimed that *Helonias bullata* would not thrive under cultivation, but I have succeeded in growing it to perfection here in Massachusetts. After trying it in different soils and situations and meeting with no success, it was at last planted in mud saturated with water the whole year, the water being allowed to stand around the plants. They have been planted three years, and last year I counted over sixty rank flower-stalks, some of them two and a half feet high.

Southwick, Mass. EDWARD GILLETT.

Stipules in Onagraceæ.—It is stated in all the books that the Order Onagraceæ is ex-stipulate. I have a *Fuchsia*, the young and vigorous shoots of which show small, but very decided stipules. If one were describing the plant, unbiased by previous conceptions, he would most certainly report it stipular. In connection with this, see *Nature*, Vol. xxii., page 521, where, quoting Baillon, it is stated that many Onagraceæ show small stipules.

Providence, R. I. W. W. BAILEY,

Contributions toward a List of the State and Local Floras of the United States

THE WESTERN STATES.

ILLINOIS (continued).*

The native naturalized and cultivated Grasses of the State of Illinois. By I. A. Lapham. (D.)
In Trans. Agric. Soc., Vol. ii., 1855–7.

Additions and Annotations to Mr. Lapham's Catalogue of Illinois Plants. By F. Brendel. (C.)
In Trans. Agric. Soc., Vol. iii., 1857–8.

List of Plants in Northern Counties of Illinois not in Lapham's Catalogue by M. S. Bebb.
In Trans. Agric. Soc., Vol. iii., 1857–8.

Mosses of Illinois. By George Vasey.
In Agric. Trans., Vol. iii.

List of Trees found in Fulton Co. By John Wolf.
In Vol. iii., Geol. of Ill.

W. R. G.
N. L. B.

*We are indebted to Prof. L. M. Underwood for this additional list. The full title of the catalogue by John Wolf and Elihu Hall (BULLETIN, Vol. x., p. 120) is:

"A List of Mosses, Liverworts and Lichens of Illinois." (Bull. No. 2, Ill. State Lab. Nat. Hist.) The continuation of Brendel's Trees and Shrubs of Illinois was concluded in Vol. iv., Agricult. Trans., 1859–60.

Botanical Notes.

Volvox globator.—Mr. J. Levick maintains* that while the idea that the pretty little microscopic alga, *Volvox globator*, is hollow has passed as so self-evident as scarcely to have been challenged, "it is easy for microscopical students to demonstrate for themselves the certainty that those charming little globes are not hollow, but solid." * * * "A little experiment, which it is easy for every one to try, shows that *Volvox* is without any cavity whatever, and that the perfectly transparent contents of the globe appear to possess little, if any, less firmness than the pellicle or membrane which forms its periphery. This may be shown by taking *Volvox* in good quantity and straining the water from them; by this means a little mass may be obtained. Let the *Volvoces* thus collected be taken up rather roughly by means of a syringe and placed in water containing carmine or any fine solid matter. It will probably be found that some of the *Volvoces* have been broken, some perhaps even into fragments which still display rolling motion. Now, if a little care is used in examining the ruptured specimens, it will be seen that the carmine adheres to any surface thus exposed, at once displaying the fact of their solid consistency." * * * "*Solid* is too strong a word, perhaps, to apply to matter which cannot be more than gelatinous, and is here used only in antagonism to the word *hollow;* but, if the spheres be stripped of their outer green covering, this envelope collapses, while the contents retain their spherical form, as is readily seen by the displacement of the carmine."

Mr. Levick also cut sections from the frozen plant and found that the internal matter, whatever it was, had sufficient density to support particles of carmine, dirt, or any other solid matter which lodged upon it.

A wingless-fruited Ptelea.—In a recent winter trip into Lower California, as far as Todos-Santos Bay, Dr. Parry discovered a new species of *Ptelea*, which was quite similar in habit and general appearance to the common northern *P. angustifolia*, but remarkably distinct in possessing wingless fruit, thus making a slight modification of the characters of the genus necessary. Dr. Parry has named the plant *P. aptera.*

The Rhododendron and Poisonous Honey of Pontus.—Mr. A. Nesbitt doubts in the *Gardeners' Chronicle* the oft-repeated assertion that honey made from the flowers of *Rhododendron Ponticum* is poisonous, and even that the plant itself is so. He says that he has observed lambs eating a small quantity of the leaves either of *T. Ponticum* or hybrids of that plant and no bad results followed. He suggests that it is possible that as the flower of the oleander is more like a rose than the rhododendron, it is probable that the former was the plant from which the honey was obtained that poisoned Xenophon's soldiers, the oleander being well known to be poisonous.

The Rev. C. Wolley Dod contributes to the same journal an interesting note which throws some light upon this point. He remarks

**Rep. and Trans.* Birm. Nat. Hist. and Micr. Soc., 1882, after *Journal* Roy. Micro. Soc., Dec., 1883.

that there were apparently two kinds of poisonous honey met with in Pontus, one found near Heracles and the other near Trebizond, the former being attributed by Pliny to a plant called "ægolethon" or goat's-bane, the other to a plant which both he and Dioscorides called "rhododendron;" but they also used the name "nerium" for it. Sibthorp has identified the latter as *Nerium Oleander*. Mr. Dod can find no direct evidence that *Rhododendron Ponticum* is poisonous; but *Azalea Pontica*, which occurs in profusion near Trebizond, about ten miles from the coast, he believes to possess poisonous properties similar to those attributed to *Kalmia latifolia*. It is a noteworthy fact, if correct, that no species of *Rhododendron* is known to be poisonous, while members of certain of the other Ericaceous genera, *Azalea*, *Kalmia*, *Andromeda* and *Ledum*, possess either poisonous or narcotic properties.

The Name Fishberries, which has long been applied to the fruit of Cocculus Indicus (*Menispermum Cocculus*, L.) because of its use in stupefying and capturing fish, is, according to Prof. James Hyatt, given to the drupes of *Prunus Caroliniana* in Tennessee, where they are locally used as a fish poison. It appears that the amount of hydrocyanic acid that this fruit contains is sufficient to poison the fish which swallow it, without rendering their flesh unsafe for food.

Botanical Literature.

Genera Pyrenomycetum schematice delineata. By P. A. Saccardo.

This latest work of the well known Italian mycologist consists of 14 lithographic plates, large 8vo, on which are delineated the 280 genera into which the Pyrenomycetes are divided in the system of classification adopted in the two volumes of the Sylloge by the same author. The figures, though not claiming artistic perfection, are good and answer well the end for which they were intended. They give, in fact, "a bird's eye view" of this vast family of fungi and may be considered as indispensable both to the amateur and the critical student of mycology. The low price of the work (6 francs) places it within the reach of all.—J. B. E.

Botanical Micro-Chemistry: an Introduction to the Study of Vegetable Histology, prepared for the use of students by V. A. Poulsen, translated with the assistance of the author and considerably enlarged by William Trelease, Professor in the University of Wisconsin. 12mo. Boston: S. E. Cassino & Co., 1884.

There has been considerable interest taken in this country for a few years past in the microscopic examination of plants, and the number of botanists who are turning their attention to the study of vegetable histology is gradually increasing. Although all the necessary apparatus for prosecuting this fascinating study has been easily procurable at moderate prices, there has hitherto been sadly needed some sort of a manual which should give the beginner directions how to proceed in the examination of the minute anatomy of tissues, while it should at the same time contain everything of importance that more advanced students might desire to be informed upon. This want has at length been supplied in the work before us, which, first

published in Danish, then in French, German and Italian, has finally been translated into English by Prof. Trelease with the sanction of the author.

The work is divided into two parts: the first treats of microchemical agents and their application, with an appendix on cements and media for mounting purposes; and the second gives descriptions of the vegetable substances and the modes of recognizing them.

The work is rendered the more valuable by the additions that have been made by the translator, and by the numerous references to other works that give more detailed information than could be crowded into the compass of this. No student of vegetable histology can well afford to dispense with this work, and for this reason, and on account of its moderate price (one dollar), we predict for it a large sale.

Thirty-third Annual Report of the State Museum of Natural History. (Botany.) Albany: Weed, Parsons & Co., 1880.

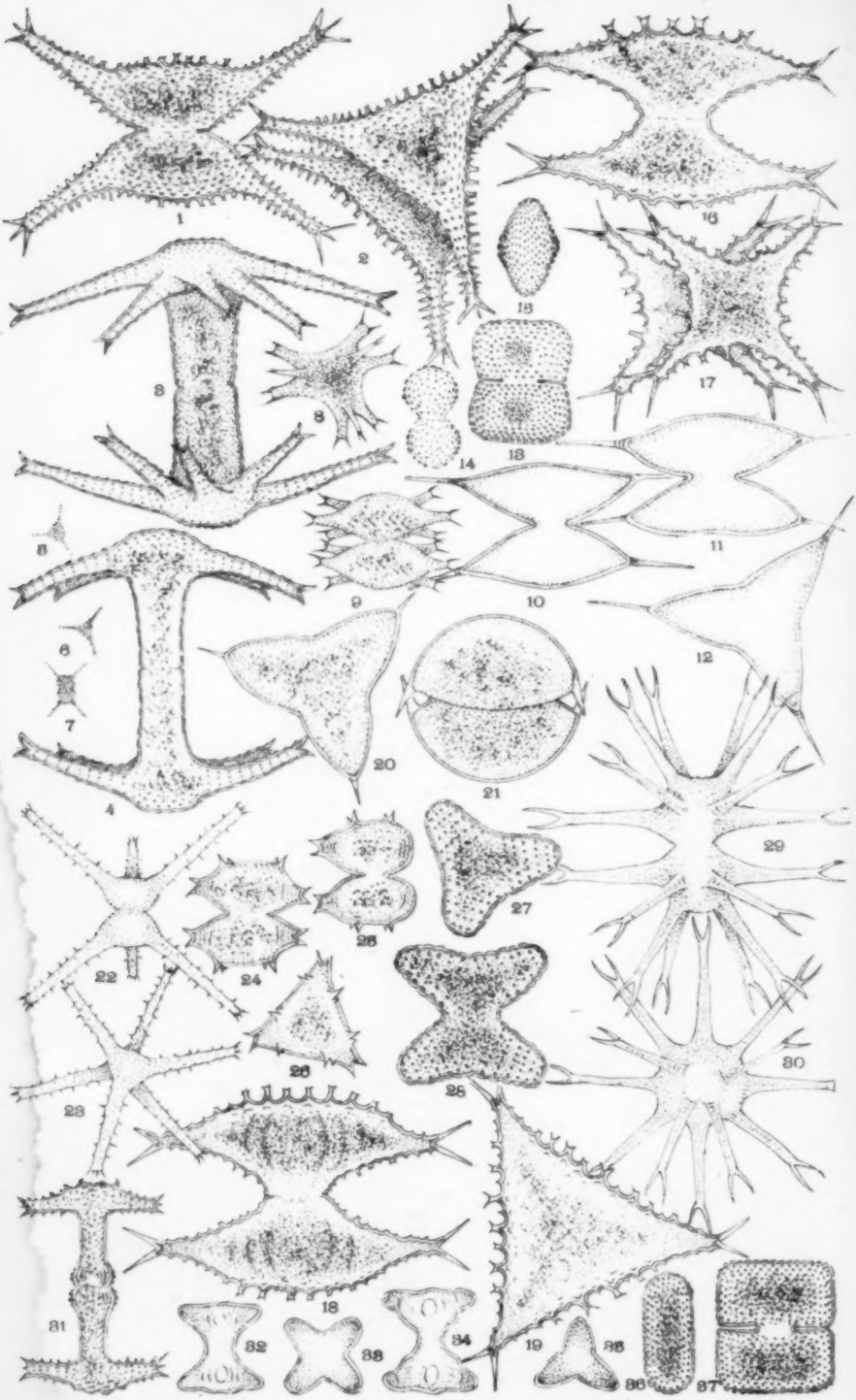
Thirty-fourth Annual Report of the State Museum of Natural History. (Botany.) Albany: Weed, Parsons & Co., 1881.

From these interesting, but much belated reports of Mr. Peck the State Botanist, we learn that during the year 1879 specimens of, 183 species of plants were mounted and placed in the herbarium, none of which was before represented therein. Of plants new to the herbarium, collected by the botanist in person and contributed by correspondents, the number was 170. Sixty-eight of the latter (all fungi) were deemed new to science, and have therefore been named and described, and, in some cases, illustrated in the plates accompanying the pamphlet. During the year 1880 the number of plants new to the herbarium that were mounted and placed therein was 167. The number of plants new to the herbarium collected by Mr. Peck and contributed by correspondents was 98. Among these there were 38 species of fungi that were new to science. To his Thirty-third Report Mr. Peck appends an account of the New York species of *Amanita*, in which he has rewritten the descriptions and supplemented them with remarks upon the variations of the species, their peculiar characteristics and their distinguishing specific features. For the benefit of students of fungi, the synonyms have to some extent been given and the spore-characters of each species added.

It is to be regretted that the scientific names of the plants (especially the new species) enumerated in these Reports were not printed in italics in order to make them more easily distinguishable from the accompanying text.

Arctostaphylos: Notes on the United States Pacific Coast Species, from recent Observations of living Plants, including a new Species (*A. oppositifolia*) from Lower California.—*New Plants* from Southern and Lower California (*Phacelia suffrutescens*, *Ptelea aptera*, *Polygala Fishiæ* and *Gilia Orcutii*). By C. C. Parry. 8vo, pamph., pp. 10. (From the *Proceedings* of Davenport Acad. Nat. Sciences.)

Notes on the Cryptogamic Flora of the White Mountains. By W. G. Taylor. 8vo. pamph., pp. 20. (From *Appalachia* for December, 1883.)



Desmids of the United States.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XI.] New York, February, 1884. [No. 2.

Fresh-Water Algæ. VIII.

By FRANCIS WOLLE.

(Plate XLIV.)

In the summer of 1883 I made my tenth annual visit to the haunts of fresh-water Algæ, choosing those in our neighboring State of New Jersey where the ponds are more numerous as well as more accessible than in Pennsylvania. In the vicinity of Ocean Beach, Monmouth Co., there is a number of what may be termed small lakes, the waters of which, though separated from the ocean by only a narrow strip of land, are very clear and fresh. Therein are to be found many interesting plants; among others I saw, for the first time, *Utricularia inflata*, a very distinct and beautiful species of bladderwort, swimming free by means of the inflated petioles, arranged in a whorl, bearing in the centre a perpendicular scape with large yellow flowers.

From among the aquatic plants I gathered many algæ, and, among these, the following desmids new to our flora:

Cosmarium depressum, Næg., and *C. obsoletum*, Reinsch; *Staurastrum pachyrynchium*, Nord. (Plate XLIV., Figs. 32–36); *S. monticolum*, Lund. (Figs. 24–26; and

S. IOTOMUM, *n. sp.* (Figs. 5–7)—Very minute; semicells quadrangular, angles drawn out into thin, diverging, granular rays, each about as long as the diameter of the body, apices obtuse; end view triradiate. Diameter, including the rays, 15–20μ.

A small species, quite plentiful at Ocean Beach and at Malaga, N. J.

Two other desmids, not new, but rare, were also found here, viz: *Cosmarium sportella* and *Euastrum attenuatum*.

From the ponds in the vicinity of Malaga, Gloucester County, I was fortunate enough to secure five new desmids, viz.:

Staurastrum leptacanthum, var. TETROCTOCERUM, *n. var.* (Figs. 29–30)—Semicells suborbicular furnished with eight, long, thin rays, deeply forked, or clawed at the ends; this whorl rather below the middle, and another above it with four similar rays; end view octangular, each angle produced into a long thin ray; between the margin and the centre are four more rays. Membrane smooth. Diameter of body 25μ.; including the rays 75–80μ.

The only essential distinction between this form and the typical Brazilian plant is that ours has *eight* and four rays in the two whorls, and the Brazilian plant has *six* and four rays.

Collected in pond near Malaga, N. J.

S. QUATERNIUM, *n. sp.*—Small, smooth, quadrangular in front view, deeply constricted; sinus acute angled, much ampliated; semicells oblong, sides rounded, end truncate, each angle furnished with

four firm aculei; end view triangular, sides concave, angles broadly rounded and furnished with four aculei. Diameter 25μ; with aculei 40–50μ.

Ponds, Malaga, N. J , and Wilkesbarre, Penn.

S. ANKYROIDES, *n. sp.* (Fig. 4.)—About as long as wide, granularly rough; semicells cylindrical, with enlargement towards the convex ends; sides produced into narrow, elongate, slightly tapering, incurved arms; margins granulate crenate, apices bifurcate; end view quadrangular, with angles drawn out into long arms. Diameter 82μ. Length 75μ.

The only water which hitherto furnished this new species was a pond near Malaga, N. J. Var. HEXACERUM, *n. var.* Somewhat stouter than the typical form and furnished with *six*, instead of *four* arms.

This variety I find in northern counties of New Jersey. In the possession of six arms it bears a resemblance to *St. coronulatum*, but, being nearly twice the length, and without the crown, it appears more nearly related to *St. ankyroides*.

COSMARIUM SEJUNCTUM, *n. sp.*—Membrane smooth, slightly longer than broad; semicells semicircular, with angles rounded, separated by a wide, nearly linear sinus; isthmus narrow, less than one-fourth the diameter of the cells. Diameter 20–25μ.

Ocean Beach, etc., N. J.

MICRASTERIAS DICHOTOMA, *n. sp.*—Semicells three-lobed; lateral lobes twice bifid; the ultimate lobules (four resulting from one), deeply furcate or clawed at their apices; the polar, or end lobe, exserted, on a cylindrical neck, with two diverging arms, clawed at the ends. Diameter 175–200μ.

Ponds, Malaga, N. J., Harvey Lake, Penn.

A visit to Brown's Mills, Burlington County, demonstrated how the most unpromising fields will sometimes at last reward the perseverance of the patient explorer, for at this place I have hitherto met with very poor success. But last August I was rewarded by the discovery of twelve new plants, viz.:

Cosmarium pseudotoxichondrum, Nord.

Staurastrum elongatum, Barker, var. TETRAGONUM, *n. var.* (Fig. 31.)

S. forficulatum, Lund., forma TETRAGONA (Figs. 16 and 17), and forma TRIGONA (Figs. 18 and 19.)

S. ASPINOSUM, *n. sp.* (Figs. 22 and 23)—Semicells smooth, in front view oval with end protracted into a colorless arm, about three times as long as the breadth of the body, diverging; apices tricuspidate, margins rough with minute, firm perpendicular, irregularly placed, aculei. End view triradiate. Spread of arms 58–63μ.

Brown's Mills, New Jersey.

The vertical spines, like the thorns of a rose, give this plant a distinctive character.

S. inconspicuum, Nord.

Docidium dilatatum, Cleve.

D. TRIDENTULUM, *n. sp.*—Cells slender, elongated, linear or slightly tapering, smooth; semicell with a prominently inflated base;

apex crowned with a few large teeth, usually three in view. Diameter 12–13μ.

Ponds, Pleasant Mills, and Browns Mills, N. J.

PHYMATODOCIS NORDSTETIANUM, *n. sp.*—(This genus is based on a plant found in Brazil, in character near the genus *Desmidium*). Cells closely united in sheathless filaments; deeply constricted in the middle; filaments quadrangular with sides longitudinally excavated.

The new species, hitherto found only in a pond at Brown's Mills, New Jersey, differs from the Brazilian plant in being one-fourth smaller, in having the lobes in end view straight, not curved to one side, and in having the sinuses of the cells not narrow linear, but somewhat enlarged inwardly and rounded at the base.

Desmidium (*Didymoprium*) *quadratum*, Nord.

D. ELONGATUM, *n. sp.*—Filaments thin; cells in front view nearly twice as long as wide; in side view nearly 2.5 times longer than broad; closely united, without a thickened border at their junction; end view broadly elliptic. Diameter at widest part, 28μ, thickness, 16–18μ.

This interesting new species from a pond at Brown's Mills, New Jersey, was found late in September last. No gelatinous sheath was observable.

Hyalotheca undulata, Nord., and *Penium Clevei*, Lund.

Further north, in Passaic County, the ponds known there as Wood, Longwood, Green and Buckaberry, furnished many algæ, including a number of desmids. A very interesting plant was *Pleurocarpus mirabilis*. Through nine consecutive seasons I had carefully sought for this *in fruit*, and only came across it, in this my tenth annual search, in Buckaberry Pond; and, oddly enough, it was found about the same time by my friend Miss Butler, of Minneapolis, then on a visit at Malden, Mass. These are, I believe, the only two places where it has been detected, although Mr. E. L. Cheeseman, of Knowlesville, N. Y., discovered it in his aquarium a year earlier.

The new desmids from these waters are:

Euastrum abruptum, Nord.

E. URNÆFORME, *n. sp.*—Semicells urn-shaped, three-lobed; terminal lobe dilated, centrally sinuate; lateral lobes horizontal with sides converging, sinuate; basal portion protruding, emarginate; upper part broadly rounded; a rounded sinus between it and the end lobe; protuberances, one at each angle of the terminal lobe, one at each of the basal angles, two intermediate and one between the end and the lateral lobes. Diameter 55–60μ.

Wood Lake, Passaic Co., N. J.

E. COMPACTUM, *n. sp.*—Very small, suborbicular, slightly longer than broad; semicells broad, transversely oval; apex a slight protuberance with a linear incision; two small prominences, one on each side below the apical protuberance. Diameter 20–22μ. Length 22μ.

E. OBTUSUM, *n. sp.*—Minute, twice as long as wide; semicells obovate; base flattened, sides roundly diverging; end broadly rounded, with a linear central incision. Diameter 14μ. Length 25μ.

Ponds, Pennsylvania.

MICRASTERIAS NORDSTETIANA, *n. sp.*—Of equal length and breadth; semicells three-lobed; the lateral lobes divided into two sub-

cylindrical segments with a wide notch between, ends obtuse smooth, or provided with three or four small teeth, polar lobe exserted, neck long, with a short, conical prominence about the middle of each side; the ends broad, sinuate, with two horizontal arms on each side, one of which is long and the other short, both in the same direction, slightly diverging.

Longwood Pond, Passaic Co., New Jersey.

Cosmarium excavatum, Nord.; *C. Kjelmanni*, Wille; *C. Beckii*, Wille; *C. Nægeleanum*, Bréb.; and

C. PSEUDOBROOMII, *n. sp.* (Figs. 36 and 37).—This species is separated from *C. Broomei*, Thw., by the total absence of a central inflation.

Frequent in ponds, Sussex Co, N. J.

In a small vial of specimens gathered by Mr. E. Potts, of Philadelphia, while exploring Harvey Lake, Luzerne County, for freshwater sponges, I found the same new *Micrasterias Nordstetiana* mentioned above and one new *Staurastrum*, which I have named

S. POTTSII, *n. sp.* (Figs. 8 and 9)—Small, smooth; semicells in front view broadly elliptic, furnished on each side with three divergent processes, apices rounded, bearing two aculei; end view triangular, sides concave, angles broadly truncate and produced into two processes with a wide rounded sinus between; a third process from a position somewhat back of the sinus rises at an angle of about 40,° thus constituting three diverging aculei-tipped processes at each of the three angles.

To the collections heretofore made by Miss Butler, at Minneapolis, I have to add three new names, as follows:

Micrasterias Rabenhorstii, Kirch.

Cosmarium protuberans, var. GRANULATUM, *n. var.* (Figs. 13–15)—Cells about one-fifth longer than broad; semicells with straight base, sides somewhat diverging from the basal line; superior angles nearly right, inferior angles obtuse; centraliy inflated; seen from the vertex, elliptic with a swelling on each side; membrane granular. Diameter 25–28μ.

Separated from the typical form mainly by the rather coarsely granular membrane; the centra linflation is also less prominent.

From pond a near Minneapolis, Minn.

EUASTRUM NORDSTETEANUM, *n. sp.*—Cells quadrangular, oblong, nearly twice as long as broad; semicells obscurely three-lobed; basal lobes broad, divided in the middle by a rounded notch into too lobules with tridentate or spinous ends; end lobe short, pouting, more or less emarginate; the two sides of apex usually inclining backward, with a subacute or rounded notch between; lateral margins furnished with two or three horizontal spines. End, transverse and side views rectangular, with broad, square, more or less sinuate ends, angles dentate.

Frequent near Minneapolis, Minn. Seen occasionally in New Jersey also.

Xanthidium antelopæum, var. MINNEAPOLIENSE, *n. var.*—A new form possessing the peculiarity of a fifth pair of aculei immediately over the central protuberance and bead-like series of granules.

My experience in the search of fresh-water algæ during the past ten years demonstrates that in New Jersey alone, hardly more than a third of the territory has been explored, and even that which has been gleaned over and over again usually presents something new and interesting wherewith to gratify the student every recurring season.

The plate which accompanies this is a copy of one of 53 (all colored) that I have prepared for a monograph on the Desmids of the United States which is now about to go through the press, and to be shortly issued to the public. It is the only work of the kind that has been published in this country, and will contain all that is known up to this period concerning our desmids, the number of which, from Wood's 160 described species, I have increased to nearly 500, and illustrated with more than 1,100 drawings sketched by myself, with very few exceptions, from living plants as they presented themselves to me in the field of the microscope. The price of the work (five dollars) will be about a third, only, of that of similar works published abroad; but, as I am desirous of exciting interest in this fascinating study, it is to be offered at a price that will reimburse me for the actual cost incurred, without reference to the time and labor that I have bestowed upon it.

EXPLANATION OF PLATE XLIV.—In addition to the species designated in the foregoing article, the following desmids are illustrated in the Plate. They are not new species but are mostly new to our flora: Figs. 1 and 2. *Staurastrum anatinum*, Cooke. Figs. 10 and 12. *St. megacanthum*, Lund. Figs. 20 and 21. *St. Dickiei*, Ralfs. Figs. 24 to 26. *St. monticulosum*, Bréb. Figs. 27 and 28. *St. striolatum*, Næg. Figs. 32 to 35. *St. pachyrhynchium*, Nord.

New Species of North American Fungi.

By J. B. ELLIS and B. M. EVERHART.

RHIZOCTONIA MONILIFORMIS.—Yellowish-white inside and out, cylindrical, .33–.5$^{cm.}$ in diameter and constricted at intervals, forming a loose net-work extending for several inches along the surface of the wood, the different parts either directly connate or attenuated at one or both ends into white, creeping fibres. Substance carnose and firm, but not as tough as in the next species.

Found under the bark of a rotten *Nyssa* log. November 1883.

RHIZOCTONIA AURANTIACA.—Suborbicular, flattened, 1$^{cm.}$ in diameter, or, by confluence, 2$^{cm.}$ or more, loosely attached by a few pale creeping fibres, dull liver-color outside, orange-red within, in which respect, as well as in its more regular shape, it differs from *Rh. tricolor*, Ell., which is black outside and red within.

Found under the bark of a rotten maple-limb at Newfield, N. J., at the same time as the preceding species.

ZYGODESMUS MURICATUS.—Purplish rose-color, becoming light buff, forming orbicular patches of a loose cottony texture, 2–4$^{cm.}$ across, or, by confluence, more; hyphæ 5–7μ in diameter, strongly muricate roughened, much branched, with a strong zygodesmoid joint just above each branch, the extremities of the branches divided into numerous oblong, cylindrical basidia with four strongly developed spicules at their obtuse apices, bearing the subglobose, strongly echinulate, 5–6μ conidia.

On rotten pine. Newfield, N. J., September 1883.

RHINOTRICHUM SULFUREUM.—Forming a thin, sulphur-colored (nearly white at first) stratum on the surface of the matrix. Prostrate hyphæ branched and septate, fertile hyphæ erect, simple, 4–6-septate, 200–250μ high by 7–8μ thick, gradually attenuated above and bearing the elliptical, 11–15x9–10μ conidia on little tubercular, lateral processes.

On rotten wood. Decorah, Iowa, October, 1882. E. W. Holway.

STILBOSPORA FENESTRATA.—Stroma subcuticular and imperfectly developed; spores elliptical, fenestrate, brown, 35–40x15–20μ on strong basidia, and, by their growth, elevating the cuticle in a pustuliform manner and finally rupturing it and oozing out so as to form little black patches on the surface.

On dead twigs of *Clethra alnifolia* Newfield, N. J., throughout the year.

NIDULARIA RUBELLA.—Peridia irregularly globose, 1–2$^{mm.}$ in diameter, often confluent, two or three together, dirty white, of a loose, thin texture and soon disappearing; sporangia of a dull, dark reddish color, orbicular or sub-elongated, about .33$^{mm.}$ in diameter, not umbilicate, under the lens the surface appearing slightly uneven, but smooth and shining as if varnished.

After the disappearance of the peridium the mass of sporangia becomes flattened out and remains attached to the surface of the wood.

Nearly allied to *N. denudata*, Fr., from which it differs in the color of its sporangia.

On decaying pine. Newfield, N. J.; autumn.

PEZIZA (MOLLISIA) GLENOSPORA.—Sessile, orbicular, .25–.5$^{mm.}$ in diameter, dull white, becoming darker; substance of the cup coarsely cellular, but fringed above with a row of erect, sub-cylindrical, continuous, hair-like cells, 8–10x2μ, rather narrower below, and their apices obtuse. (This structure is only visible with a considerable magnifying power, the margin with a pocket lens being scarcely visible.) Asci clavate-cylindrical, 75–80x9–10μ; paraphyses curved and swollen at their tips; sporidia elliptical, or rather more acute at one end, with a single large nucleus, 12–15x7–8μ.

The young sporidia are filled with numerous globose nuclei, but these soon unite into one and often cause the sporidia lying in the asci to appear globose, since the two ends, because of the thin epispore, are so transparent as to be almost invisible.

On rotten *Magnolia*. Newfield, N. J., November, 1883.

Untenable Names of Carices.—A number of old and doubtful names was resuscitated by Olney and made to replace familiar ones in his published fasciculi. These names have in some instances been adopted in local floras, and should be arrested before coming into more general use. The doing away with generally adopted names results at best in more or less confusion, and it should not be tolerated when any doubt exists as to the application of the revived names. The following names introduced by Mr. Olney are uncertain as to application, and deserve not to be regarded as synonyms even:

Carex Nuttallii, Schw., for *C. crus-corvi*, Shuttleworth. This name was first published in 1824, by Schweinitz, in his preliminary Analytical Table, a list containing no descriptions, and intended as a temporary affair to precede his monograph. The plant was credited to Arkansas. It had spikes "corymbosely ramose," with a habit "near *C. Indica*." The name may have referred to the plant now called *crus-corvi*, but it is entirely uncertain, and Schweinitz did not again use it.

C. albo-lutescens, Schw., for *C. adusta*, Boott. This name was also published in the Analytical Table, and was probably founded upon an immature specimen. So uncertain was the species that in the subsequent monograph of Schweinitz and Torrey the name was not mentioned. Dr. Boott, Ill., iii., 120, makes it a synonym for *C. straminea*, var. *festucacea*.

C. Muskingumensis, Schw., for *C. arida*, Schw. and Torr. Under rigid rules of priority this name will hold. It was made by Schweinitz in his Table, but, disliking it, he and Torrey substituted *arida* in their Monograph, under which name it was first described. Rules of nomenclature in those days of comparatively few names were less rigid than now, and no breach was made in suppressing a little-known and unwieldy name. It is no service to science to unearth a name buried by common consent in its infancy, when its unearthing but increases confusion.

C. microdonta, Torr., for *C. Crawei*, Dew.—This name was made by Torrey and Hooker and published in Torrey's Monograph of the Cyperaceæ in 1836. It was given to a Texas plant, No. 439 of Drummond's collection, It refers to a plant differing from *Carex Crawei* in its toothed perigynium and laxer habit. It may prove to be an older name for *C. alveata*, Boott. Texas specimens referred to *C. microdonta* in the Gray Herbarium approach *C. granularis* in appearance. When sufficient material accumulates, *C. Crawei* and *C. microdonta* may be found to be the extremes of the same species, but at present they must be kept distinct.

L. H. Bailey, Jr.

Concerning Abutilon.—On further consideration, I am convinced that Professor Macloskie and myself are wrong in our morphology—a little confused as to facts. In *Abutilon Avicennæ* there sometimes occurs a bract like that which I noticed in another species, and also one or two smaller ones; but they are below the joint in the peduncle or pedicel, and I think that the small bracts are axillary to the larger one. However that may be, it seems plain that this is an attempt toward the two-flowered peduncle, which is quite common in that species. Now the "involucel," as botanists are particular to call it, of mallow and hibiscus is always close to the calyx, above the articulation when there is any, and never has a sign of any second flower within it. It is so strictly connected with the flower that some botanists have called it *epicalyx*. *Hypocalyx* would be a better term if a special name were needed. I have not yet found any bracts on the peduncle of *A. vexillarium*, but I do find what appears to be a five-lobed involucel, close pressed to the base of the calyx and wholly

above the joint. If so, this is the true homologue of the involucel of the mallow. But what troubles me is that this minute involucel, as it would appear to be, is completely continuous with the base of the calyx, and differs from it only in its green instead of red color. If this is what Dr. Macloskie has in view, I would like to ask if he finds it at all separable from the calyx, and, if not, whether it is an organ at all? And I now wish to insist that in any case, whether it is a discoloration or an involucel, it is not the representative of the bract or bracts low down on the peduncle of the velvet-leaf.

Providence, February 10th 1884. W. W. BAILEY.

Note on Juncus trifidus, L.—In looking over some plants collected in the Shawangunk Mountains* last August, I find specimens of *Juncus trifidus*, L., from the exposed conglomerate ledges at Sam's Point, Ulster County, N. Y., where it grew plentifully. Mr. C. H. Peck informs me that it is known from but three other localities in the State, viz., Mt. Marcy and Mt. Whiteface in the Adirondacks, and near Lake Mohunk, the latter station being about fifteen miles north of Sam's Point, on the same mountain range.

N. L. BRITTON.

Death of Dr. George Engelmann.—Lovers of the science of botany will be pained to learn that the long and active life of Dr. George Engelmann was closed on the 4th inst., at his residence in St. Louis.

Dr. Engelmann was born at Frankford-on-the Main, Germany, Feb. 2d, 1809, and was consequently, at his death, seventy-five years and two days of age. His university education was acquired at the universities of Berlin, Heidelberg and Wurzburg. In 1832 he came to the United States and three years after setting foot upon the eastern shore of the country he found himself in St. Louis, in the heart of the country. There he began the practice of medicine and continued the study of it and other sciences. In the year 1839 was founded the Western Academy of Science, Dr. Engelmann being one of the organizers. For a number of years the society flourished and then died. He was one of the originators of the St. Louis Medical society, and was for some time the president of that body. In 1856 the St. Louis Academy of Science was organized, and he was one of the founders and for many years held the honorable position of president.

As we may expect a full account of his life and labors from the hand of one whose name has several times been associated with his in botanical investigations, we refrain from giving such details of his biography as we find in the daily papers, and which may not be in every respect accurate.

Necrology.—The friends of science, and mycologists especially, will learn with regret of the death of Wm. T. Haines, which occurred at his residence in West Chester, Pa., on the 2nd of February, 1884. Mr. Haines, in addition to his great legal

* See BULLETIN, October, 1883.

abilities, was well-known for his devotion to scientific pursuits, and, during the last few years, his labors with those of his colleagues, Messrs. Everhart, Jeffries and Gray, have added many interesting species to the mycologic flora of Chester County.

The friends who were accustomed to accompany him in "fungus forays" through the grand old woods around West Chester will long cherish the recollection of those excursions among the pleasant memories of the past.

J. B. Ellis.

Botanical Notes.

Coloring Matter of Flowers.—H. Hansen has separated the two constituents of chlorophyll by Kühne's method. He has also examined the coloring matter of flowers. The yellow pigment is lipochrome and can be crystallized It shows two bands in the blue and no fluorescence; that described by Pringsheim resulted from a small admixture of chlorophyll. The red coloring matter is in a state of solution in the cells. The spectrum shows a broad band between D. & *b.* The shades of red are often caused by an admixture of lipochrome, as in *Papaver*, *Lilium bulbiferum*, etc. The blue and violet pigments are also in a state of solution and show bands in the red half of the spectrum. Acted upon by acids, they become red. None of these pigments shows spectra resembling that of chlorophyll, except when a small quantity of that substance is present. *(Jour. Royal Micros. Soc.)*

Proceedings of the Torrey Club.—The regular meeting of the Club was held at Columbia College, Tuesday evening, Dec. 11th, 1883, the President in the chair and twenty-four persons present.

Messrs. Schrenk, Day and Britton were appointed a permanent committee to act with Mr. E. Steiger in preparing a catalogue of the plants of Central Park.

A permanent Committee, consisting of Messrs. Britton and Hyatt, and Miss Knight, was appointed to organize a sub-section for the study of physiological botany.

Dr. Willis showed specimens, from a dry hill near Scarsdale, N. Y., of a *Melanthium*, which Dr. Britton identified as *M. latifolium.* Desrouss, a species which grows on dry ground, while *M. Virginicum* occurs in swamps. One person was elected an active member.

According to previous announcement, the President, Dr. Newberry, was to have delivered an address upon the Vegetation along the Line of the Northern Pacific Railroad, but, owing to the lateness of the hour, he was obliged to confine himself to a description of the forest trees. The following is an abstract:

On the Forest Trees of the Country Bordering the Line of the Northern Pacific Railroad.

In going westward from Lake Superior the arborescent vegetation ceases near Brainerd, the last trees being white pine, Banks's pine, the larch, white birch, white maple and aspen. Thence to the Rocky Mountains a continuous sheet of herbaceous vegetation

covers the surface, and no trees are seen except cottonwoods (*Populus monilifera*) along the Missouri. The first ranges of the Rocky Mountains on this route along the Yellowstone River and in the Park are covered sparsely or densely with trees, the higher summits and ridges with *Pinus flexilis*, James, *Abies grandis*, and *Tsuga Douglassii*, Carr., while the foot-hills, and, in some cases the levels, are thickly set with *Pinus contorta*, Dougl., var. *Murrayana*, Watson. This latter is regarded by some as a distinct species (*P. Murrayana*, Murr.), but is only an upland form, which is larger and more spreading. Both varieties, however, grow in proximity in many parts of Oregon and Northern California. In the lowlands of the Park are dense thickets of dwarf willow and here and there a tree of *Populus angustifolia*, James, and *Pinus ponderosa*, Dougl.

The divide west of Helena is covered with scattered trees of Douglass's spruce, which here reaches a height of one hundred feet. In the gorges which head in the mountains there are a few trees, often of good size, of *Pinus ponderosa*, Dougl., but they are here out of place and belong properly to the arid country between the Rocky Mountains and the Cascade Range.

In the valley of Clark's Fork and about Pend'Oreille Lake the forest growth is quite strong, the rocky cliffs and ridges are set with Douglass's and Menzie's spruces, while the lowlands sustain a crowded growth of slender trees belonging to three species which are characteristic of the Western flora, probably not crossing the divide. These are *Pinus monticola*, Dougl., *Larix occidentalis*, Nutt., and *Thuya gigantea*, Nutt. Of these, the first has altogether the habit of our white pine in trunk, foliage and branches, but is at once distinguished by its longer and more slender cones. In the Cascade Mountains this species occurs sparingly over a large area, but I have never seen it elsewhere in such abundance as on Clark's Fork. The same is true of the *Larix;* larger trees than any found here are scattered over the eastern slope of the mountains of Oregon, but they are comparatively rare. The *Thuya* extends from the sources to the mouth of the Columbia, constantly increasing in size; in the Rocky Mountains never attaining more than one-half the dimensions it reaches on the lower river. As we descend the valley of Clark's Fork the western hemlock (*Tsuga Mertensiana*, Carr.) begins to make its appearance; at first as shrubs or low trees simulating exactly the hemlock of the Eastern States, from which this has only a varietal difference. On the Lower Columbia it grows, like many other conifers, to be a majestic tree.

Between the last ranges of the Rocky Mountains, near Pend' Oreille Lake and the Cascades, the prevailing and almost the only tree is *Pinus ponderosa*, Dougl. It scarcely forms forests here, but is scattered over the country in considerable abundance and attains a large size.

Passing the gorge of the Columbia we come into the dense forests of the Pacific Coast proper, where the number and magnitude of the trees is greater than I have seen in any eastern or even tropical region. The trees of several kinds here reach an altitude of three hundred feet, and often stand so near together that all undergrowth is

absent, and the horseman makes his way through them with difficulty. On the lowlands the Douglass spruce and the western arbor vitæ are the most abundant. Locally, the hemlock is common, and along the rivers the Northwestern cottonwood (*Populus trichocarpa*, T. & G.) stands thick and attains a large size. Along the smaller streams, and in swampy places, the Oregon ash (*Fraxinus Oregana*, Nutt.) and the arborescent alder (*Alnus rhombifolia*, Nutt.,) occur in considerable numbers and attain about equal size, *i. e.*, a diameter of one foot and a height of fifty or sixty feet. Scattered through this lowland forest are the two common maples of the West (*Acer macrophyllum*, Pursh, and *A. circinnatum*, Pursh.) Of these, the first grows sometimes to the height of eighty feet with a diameter of trunk of twelve to fifteen inches, and on young plants the leaves sometimes attain a breadth of a foot or more. The vine-maple is a peculiar feature in the forests of the Lower Columbia, Puget Sound and Vancouver's Island. It never becomes more than six inches in diameter and several trunks usually spring from the same root. These are very slender, droop, and, frequently reaching the ground, take root at the summit. Where these interlacing trunks are numerous they form a thicket which is almost impenetrable.

On the higher and more rocky portions of the country the Western balsam fir (*Abies grandis*, Lindl.) and its congeners *A. nobilis*, Lindl. and *A. amabilis*, Dougl., are locally numerous and attain great size, *i. e.*, reach a height of from one hundred and fifty to two hundred feet, and a trunk diameter of five to seven feet. With these, which form a distinct sub-genus, are the omnipresent Douglass spruce, and Menzies spruce, formerly known as *Abies Menziesii*, Dougl., but now generally called *A. Sitchensis*, Carr. Still higher, and reaching to the line of perpetual snow, are *Pinus flexilis*, James, var *albicaulis*, and *Tsuga Pattoniana*, Englm., the latter the most beautiful of all conifers. Less common than the preceding conifers, but locally abundant in the country bordering the Lower Columbia and Puget Sound, are two cypresses (*Chamæcyparis Lawsoniana*, Parlat., and *C. Nutkaensis*, Spach.) Of these, the first, sometimes called the ginger pine, from the fragrance of its wood, is much admired and cultivated for its beauty and esteemed for the excellence of the lumber it furnishes. Scarcely less interesting to the botanist is the western yew (*Taxus brevifolia*, Nutt.), a tree often forty to sixty feet in height growing sparingly in the lower portions of Oregon and Washington. Three species of juniper are scattered over the dryer and more rocky parts of the country bordering the Columbia, viz., *Juniperus occidentalis*, Hook., in the foothills of the cascades, often an erect tree 40–50 feet in height; *J. Utahensis*, Englm., low and spreading, in the interior; and *J. communis*, L., generally distributed and closely resembling in foliage, fruit and mode of growth, the eastern and European plant.

Among the great conifers of the Pacific coast, two of the most gigantic and valuable, the sugar pine (*Pinus Lambertiana*, Dougl.) and the redwood (*Sequoia sempervirens*, Endl.) approach, and the first reaches the line of the N. P. Railroad, though their habitat is more southern, and both are important elements in the resources of the country from which it will derive much of its business. Of these,

the sugar pine—nearly related to the eastern white pine, by habit, foliage, cones and wood—is the monarch of the genus, frequently reaching a height of 300 feet, with a diameter of from 10 to 15 feet. This grows chiefly in the Sierra Nevada and Cascade Mountains throughout Oregon and California. The redwood is even larger. It is found only along the coast and about Port Orford forms forests, which surpass, in the average dimensions of the trees, any others I have seen. The lumber furnished by both these great trees is excellent; and, like the white pine of the East, they are suffering such wholesale destruction as promises soon to exhaust the supply they furnish. The next in intrinsic value as timber trees, and, from their abundance, having even greater economic importance, are the Douglass and Menzies spruces, the "white fir" (*Abies grandis*, Lindl.) and the western white cedar (*Thuya gigantea*, Nutt.) These form the basis of the lumber industry of the Puget Sound region and supply all the great saw-mills, some of which cut 250,000 feet per day. The timber furnished by these trees is good, but the lumber is inferior.

With the array of magnificent conifers which flourish in the moist and equable climate of the North Pacific coast, the poverty of the angiospermous flora is in striking contrast. Two maples, two poplars, —one on the high and other on low grounds—one ash and one alder have been enumerated. To these should be added two arborescent willows (*Salix lasiandra*, Benth., and *S. longifolia*, Muhl.) one oak of little value and two other hard-wood trees, and the list is complete. On the last mentioned trees I have made the following notes:

In the open grounds of the Willamette Valley, Puget Sound and Vancouver's Island, Garry's oak (*Quercus Garryana*, Dougl.) is not uncommon. It is usually of moderate size and of a peculiar straggling and misshapen growth; occasionally trees of three or four feet in diameter are met with, but the shape is so irregular and the wood so brittle that it has little value as a timber-tree. In the forests of both Oregon and Washington Territory two trees are sometimes seen that are sure to attract the attention of the eastern botanist. One of these which grows on the higher grounds, is the Oregon chinquapin (*Castanopsis chrysophylla*, A. DC.) generally a shrub, but sometimes reaching an altitude of fifty or sixty feet, and conspicuous from the golden pubescence of the under side of the leaf. The other tree to which I refer is the madroña (*Arbutus Menziesii*, Pursh.) This is a small tree, but one much admired; the foliage is persistent and rich, the leaves oblong or lanceolate with serrated edges, and the fruit, which grows in clusters, is red, and somewhat resembles that of the mountain ash, but is less abundant and grows in more open panicles.

Note on Plate XLIII.— Through an oversight on the part of the Editor the following sentence was omitted from the description of Plate XLIII., which appeared in our last number: "All the powers refer to the original drawings, which, in the plate, appear reduced to one-half their size."

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Two Lichens of the Pacific Coast.

By EDWARD TUCKERMAN.

The development of a stalk-like, descending thallus in the typical horizontal and crust-like one of the genus *Lecidea*, in *L. conglomerata*, Ach., is so rare that another example of it in the Italian *L. caulescens*, Anz., acquires an importance the value of which is not affected if we regard it as only such a condition (American also) of *L. squalida*, Ach., as is our *Lecanora cervina*, v. *thamnina* (Syn. N. Amer. Lich., p. 202) of this *Lecanora*. It is indeed possible that such outgrowth may prove less rare, or even, in the proper conditions, not very uncommon; and I observe it, also, in the admirably exhibited *L. Cenisia* of California, in specimens from the Yosemite granite (Bolander.) The Pacific coast, which furnished these lichens, has proved at once fertile and various in illustrations of the vertical thallus, and I venture to think that we may add one more to them; referable this neither to the typically ascendant and shrub-like, as *Stereopelte*, Th. Fr., and *Pyrenothamnia*, mihi (LICHENES FRUTICULOSI) nor the typically horizontal just above noticed, in which the members of a properly squamous thallus, in certain conditions of the substrate, extend downwards into branching stems (LICHENES RADICATI, *si placet*) but where what should be a laciniate, crustaceous lichen, the appressed, effigurate circumference of which is without apparent variation from the ordinary type in such lichens except indeed the sufficiently important one that the cortical layer extends to the under side, runs, at least at the thickened centre, with more or less distinctness, into ascendant branches (LICHENES RAMEO-LACINIATI) of which our examples are the Californian *Lecanora thamnoplaca*, mihi (Gen. Lich. p. 113 *) and the widely diffused *L. melanaspis*, Ach. The nakedness and ready separableness, or even large separation of the under side from the substrate in this last lichen, due to the continuity of its cortical layer, as well as the looseness of extreme conditions of it, have been noted by authors, but not, so far as I am aware, that its divisions are something more than "inflated" laciniæ, and really pass at last into vertical stems. This is the case, however, in the thickest portions of *L. melanaspis*, as it grows in Colorado and New Mexico (Brandegee, in herb. Sprague) and, especially, in the cushion-like clumps exceeding now a quarter of an inch in thickness, in which the same acute observer has found the lichen to occur nearer the Pacific, in Washington Territory. Here the turgid, loosely intertangled divisions are seen below to pass into quite terete ones becoming vertical, and it is not always easy to refer the plant to the species as elsewhere represented (California, Bolander; and especially Kansas, Hall) irrespective of apothecial difficulties, now, and in Europe as well as here, not

* In the writer's later synopsis this marked feature escaped attention in the diagnosis, though plainly indicated in the specific name.

a little pronounced. And I find precisely the same modification of structure in a well-marked, purchased specimen collected in the Pyrenees; as in other European ones. In the fruit, while not in this really separable from the foreign plant, ours is variously emphasized; the New Mexican specimens offering flat and well-margined, glaucous-pruinose apothecia, and those from Washington Territory naked ones, in which the disk finally equals and surpasses the margin, and the fruit becomes curiously glyphidoid-difform, an anamorphosis to be observed now in extreme forms of *L. cinerea*, v. *gibbosa*, Nyl. (California; H. Mann) and noticeably enough prefigured, in both lichens, by the *Pertusaria*-like younger conditions. The described margin of the disk of *L. melanaspis* is indistinct or obsolete commonly here, as it appears to be, for the most part, elsewhere.

But I have also to notice a fruticulose member of a genus not before known to exhibit this kind of thallus:

STAUROTHELE BRANDEGEI, *sp. nov.*—Thallo fruticuloso (alt. 3–5$^{mm.}$) erecto, e tereti ramulis dactylinis obsesso mox compresso et superne dilatato lobatoque, in crustam verrucosam plus minus stipato, fusco, subtus dilutius; apotheciis globosis (lat. o$^{mm.}$,3–5). Sporæ solitariæ visæ, muriformi-multiloculares, nigro-fuscæ, longit. o$^{mm.}$,026–50, crassit.o$^{mm.}$, 020–24, paraphysibus diffluxis.

Mountains of Washington Territory; T. S. Brandegee, in herb. Sprague. The internal structure of the thallus offers no differences from that of the *umbrina*-stock. This group, which is not uncommon both west of the Rocky Mountains and in the Appalachian system, offers other marked evidences of its superior rank in the Tribe, exhibiting now an effigurate and even lobulate circumference, which, scarcely more than hypothalline in the European *Dermatocarpon Ambrosianum*, Mass. (*Lich. Ital.* n. 30) is here (in the eastern *S. Drummondii* and *S. Petersii*) very distinctly thalline, and occurs (in Oregon specimens very close to *S. umbrina*, in herb. Sprague) with much the aspect of a reduced form of *Lecanora molybdina* (Wahl.) Ach. Hymenial gonidia of *S. Brandegei* oblong, guttated, o$^{mm.}$,006–12 long, and o$^{mm.}$, 0025–40 thick.

New Species of Fungi.

By CHAS. H. PECK.

POLYPORUS DELECTANS.—Pileus sessile, convex or subtriquetrous, frequently elongated, simple or subimbricated, fleshy-fibrous, becoming corky, azonate, glabrous or slightly floccose-tomentose, uneven, white becoming yellowish, the margin acute; pores plain or slightly concave, decurrent, large, unequal, subrotund or angular, whitish, the dissepiments at length acute, dentate or lacerate; spores subglobose or broadly elliptical, .00025 to .0003 in. long. Pileus 2 to 4 inches long, about 2 inches broad.

Prostrate trunks in woods. Ohio; A. P. Morgan. The species belongs to the Anodermei, section Carnosi, and is related to such species as *P. lacteus*, *P. destructor*, etc. From the former its large pores will distinguish it, from the latter its paler color and the entire absence of zones both without and within, and from *P. molliusculus* both the absence of zones and the much thicker substance will separ-

ate it. According to Professor Morgan's notes, the dissepiments are at first thick and obtuse. In the dried specimens they are thin, acute and uneven or dentate. They do not become distinctly flexuous or labyrinthiform, and their length is scarcely equal to the thickness of the flesh of the pileus.

MYRIADOPORUS, *Gen. nov.*

Hymenium cellular-porous; pores of the surface shallow, open, the others imbedded in the hymenium, variously directed, short, closed, inseparable from each other and from the hymenophore.

This is a singular genus of Polyporei, at present represented by two species, both of which are resupinate and bear a striking resemblance to certain resupinate species of *Polyporus*. I have not been able to find spores in either species, and can scarcely avoid the suspicion that both may be abnormal developments of species of *Polyporus*. Still, the structure is so peculiar that I have thought best to describe it. The pores do not, as in *Polyporus*, form vertical, parallel tubes, but rather cells or short tubes variously directed, so that a vertical section of the hymenium, as well as a horizontal one is porous. In the thickening of the hymenium, new pores are begun and old ones are closed from time to time and are thereby changed into cells or vesicular cavities. In both species the pores are minute, and sometimes contiguous ones run into each other.

MYRIADOPORUS ADUSTUS.—Hymenium about one line thick, distinct from the whitish or pale cream-colored subiculum, from which it is separated by a definite line, grayish-black, varying slightly in color within, wherefore appearing substratose in a vertical section; pores minute, those of the surface unequal, somewhat angular, occasionally confluent.

Decaying wood. Ohio; Morgan.

The hymenium closely resembles in color that of *Polyporus adustus*, and the subicular hymenophore is very similar in hue to the corresponding part of that *Polyporus*, so that our plant might at first sight be taken for a resupinate form of that fungus. It forms a statum two inches or more in length, and, when separated from the matrix, rolls up in drying. The stratified appearance of a vertical section of the hymenium is apparently due entirely to a variation in color and not to any interruption in the structure.

Polyporus induratus, Pk., 31st Museum Report, p. 37, has a similar structure, and, if the genus shall prove to be a valid one, this will stand as *Myriadoporus induratus*. In it the hymenium is concolorous with, and inseparable from, the subiculum. The general appearance and color of the fungus are suggestive of *Polyporus obducens*.

VALSA MINUTELLA.—Pustules minute; perithecia six to twenty in a pustule, nestling in the bark, crowded, black; ostiola erumpent in a minute subferruginous disk which is closely surrounded by the ruptured epidermis, black; asci short, clavate or subfusiform, scarcely pedicellate, .0009 to .0012 in. long, .0002 to .00025 in. broad, spores allantoid, crowded, .0002 to .00025 in. long.

Bark of beech (*Fagus ferruginea*), Canada; Professor J. Macoun.

Very small in all its parts and readily recognized by its minute pustules and subferruginous disk.

VALSA GRISEA.—Pustules small, perithecia four to fifteen in a pustule, nestling in the inner bark, their necks converging and piercing the small, orbicular, erumpent, grayish or brownish disk; ostiola punctiform, black; asci clavate, .002 to .0024 in. long; spores allantoid, colorless, .0004 to .0005 in. long.

Dead branches of ash (*Fraxinus Americana*) and of maple (*Acer rubrum*), Canada; Macoun.

The pustules are often arranged in rows. The grayish disk becomes darker with age.

VALSA FRAXININA.—Pustules small; perithecia minute, three to ten in a pustule, nestling in the inner bark; ostiola minute, punctiform, black; asci subclavate, .002 to .0024 in. long, .0003 in. broad; spores allantoid, crowded, colorless, .0005 to .0007 in. long, .00016 to .0002 in. broad.

Dead branches of ash (*Fraxinus Americana*), Canada; Macoun.

Closely related to the preceding species, from which its larger spores and the absence of a grayish, pulverulent disk will separate it.

VALSARIA PURPUREA.—Pustules prominent, erumpent, covered with a purplish tomentum; perithecia six to twenty in a pustule, crowded, subglobose, black; ostiola piercing the tomentum, rostrate, cylindrical or elongated-conical, rugged, sometimes curved or flexuous, black; asci cylindrical, paraphysate, .003 to .0045 in. long, .0004 in. broad; spores uniseriate, colored, oblong-elliptical, uniseptate, .0006 to .00065 in. long, .0003 to .00035 in broad.

Dead bark of ash. Canada; Macoun.

Remarkable for, and easily known by, the purplish tomentum of the pustules.

HYPOMYCES XYLOPHILUS.—Subiculum effused, whitish; perithecia numerous, crowded, small, subflavid, with a blunt ostiolum; asci cylindrical, .0035 to .0045 in. long, .00025 to .0003 in. broad; spores simple, uniseriate, subfusiform, .0006 to .0007 in. long, .0002 to .00025 in. broad.

Decaying wood. Ohio; Morgan.

The species is remarkable for its peculiar habitat. By reason of its simple spores it belongs to the subgenus Peckiella.

PYRENOPHORA DEPRESSA.—Perithecia .010 to .014 in. broad, depressed or collapsed, at first covered by the epidermis, then erumpent or naked, black, sometimes surrounded at the base by a few appressed, black, radiating filaments, furnished above with a few short, erect or divergent, straight, black, setæ; asci cylindrical or subclavate, .0045 to .006 in. long; spores crowded or obliquely monostichous, oblong or subovate, triseptate, with one or two longitudinal septa, colored, .0011 to .0014 in. long, .0006 to .0008 in. broad.

Dead stems of *Arabis*. California; M. E. Jones.

PYRENOPHORA FENESTRATA.—Perithecia .011 to .015 in. broad, depressed, at first covered by the epidermis, then erumpent or becoming naked, hispid with a few straight, divergent, black setæ; asci fugacious; spores oblong, fenestrate, deeply colored, black in the mass, .0016 to .002 in. long, .0007 to .0009 in. broad, with about seven transverse septa, generally constricted in the middle.

Dead stems of herbs. Utah; Jones.

A New Species of Cyperus.

By N. L. Britton.

Cyperus Rusbyi.—Culm slender, triangular, smooth, about a foot in height; leaves narrowly linear, smooth, shorter than the culm; involucre about five-leaved, equalling the rays; umbel three- to five-rayed, one or two of the rays elongated to a length of about three inches; heads composed of four to seven, lanceolate, acute spikelets, which are thirteen- to twenty-flowered, their axes not winged; scales about eleven-nerved, the mid-nerve slightly darker, keeled, distichously arranged, broadly ovate and obtuse when unfolded, all fertile; achenium black, smooth, sharply triangular obovate; stamens three; roots fibrous, with short, scaly rhizomes.

Collected near Silver City, New Mexico, in 1880, by Mr. H. H. Rusby, for whom it is named.

Notes on New England Algæ. III.—The different character of the marine flora of the New England Coast in its northern and southern parts has been noticed by all algologists. North of Cape Cod it is distinctly arctic, while south of Cape Cod it has, as pointed out by Professor Farlow, considerable resemblance to that of the Adriatic. The only important exception hitherto recorded is Goose Cove, Squam, on Cape Ann, a small pond, separated by a dam from the sea, and where the water becomes quite warm in summer. Three species found here by Professor Farlow, *Rhabdonia tenera*, Ag., *Gracilaria multipartita*, Ag., and *Chondriopsis tenuissima*, Ag., though common to Vineyard Sound, etc., were new to the northern coast. Since then the *Gracilaria* has been found in ditches in the Mystic River marshes, but the other species have not been recorded from any new locality.

Among the algæ collected by the late Silas Durkee, M.D., and now in the herbarium of the Boston Society of Natural History, is a small specimen of *Dasya elegans* marked "*Dasya pedicellata*, Ag., Boston." Last summer I made a number of excursions to various points within fifteen miles of Boston to see if this or any other of the southern species were to be found there. I was much more successful than I anticipated, and in Weymouth River and the adjoining cove running up into Quincy, I found a rich flora of characteristic southern forms. In July and August I found *Dasya elegans*, Ag., *Grinnellia Americana*, Harv., *Griffithsia Bornetiana*, Farlow, *Lomentaria uncinata*, Meneg., *Champia parvula*, Harv., *Mesogloia divaricata*, Kütz., *Polysiphonia atrorubescens*, Grev., and *P. variegata*, Ag., all floating in great abundance. The fronds of *Dasya* were frequently over two feet long, and the *Grinnellia* grew in tufts, sometimes of twenty fronds or more, each over a foot or more in length. The *Griffithsia* was more luxuriant than I had ever seen it, even in such a place as Buzzard's Bay, where it reaches very good dimensions; the *Lomentaria* appeared in all the forms described in the Nereis Boreali-Americana; the *Rhabdonia* was of good size, and often had on it plants of *Callithamnion byssoideum*, Arn., var. *unilaterale*, Harv. *Chondriopsis tenuissima*, Ag., and var. *Baileyana*, Farlow, were growing

abundantly between tide-marks. In September, I found the same species of *Polysiphonia* as in July, but the plants were much denuded; *P. fibrillosa*, Grev., I found for the first time here, and in good condition; *Griffithsia* had disappeared; *Dasya* and *Grinnellia* were represented only by small forms growing on *Zostera; Champia* was very abundant and well developed, with abundance of both kinds of fruit, and I found a small frond of *Gracilaria multipartita*, Ag., var. *angustissima*, Harv.,

All the species named are characteristic southern forms, most of them hitherto unknown in this region; and the locality is fully open to the ocean, shipping passing in and out continually. The water is undoubtedly warmer than in Massachusetts Bay, but the difference cannot be very great, as the tide rises and falls from six to eight feet, and the rapid current in and out must mix the waters quite thoroughly. This is quite different from Goose Cove, where there is almost no communication with the sea, and the summer temperature is quite high; yet, as we have seen, the Weymouth flora is much the richer. I think it probable that similar "colonies" must occur at other points on the shore, especially along Plymouth and Barnstable Counties. One certainly exists at Truro, on the inside of Cape Cod. Among algæ collected by Mr. W. P. Rich, I found fine specimens of *Spyridia filamentosa*, Harv., the only reported instance north of Vineyard Sound, and also the *Griffithsia*, *Mesogloia*, *Champia*, and *Polysiphonia variegata* found at Weymouth. It would be interesting to know if there grew at any such places some species equally common in southern New England with the plants found at Weymouth, such as *Sargassum vulgare*, Ag., *Stilophora rhizodes*, Lyng., *Hypnea musciformis*, Lamour., etc.

I also found at Weymouth, in addition to the species named and the ordinary species of the vicinity, *Castagnea Zosteræ*, Thuret, *Dictyosiphon fæniculaceus*, Grev., subspecies *flaccidus*, Aresch., *Bryopsis plumosa*, Lamour, an *Ulva* and an *Ectocarpus*. Both the latter are, I think, new to America, but I defer further mention until I am more certain of the species. It is interesting to observe how the warm southern and the arctic floras meet here. *Dasya elegans* is a characteristic plant of the Mediterranean basin, and does not extend north of Spain; at Weymouth it grew in the greatest luxuriance, while the tide brought up from the lower harbor *Euthora cristata*, Ag., and *Ptilota serrata*, Kütz., both arctic species, the former reaching its southern European limit in the north of Great Britain, the latter in Norway.

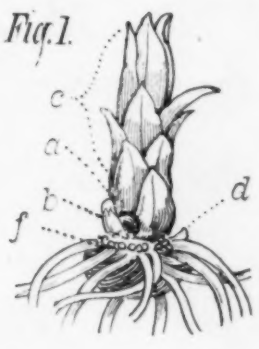
F. S. Collins.

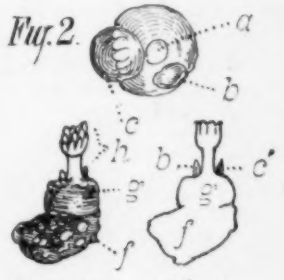
Cement for Mounting Plants.—Take of bisulphide of carbon any quantity desired, and dissolve therein a sufficient quantity of crude India rubber to make a cement of the proper consistency. This is the best compound that can be made for the purpose of mounting plants, as well as for use where a strong cement is desired. It is always ready for use.

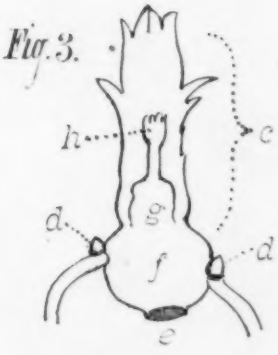
Paola, Kansas. J. H. Oyster.

The Development of Dodecatheon.—The development of our native plants has been so little studied that almost any of them is capable of presenting new facts. In *Dodecatheon Meadia*, L., I think I have found some new phases of development which are of sufficient interest to warrant my publishing them.

Taking the plant during the last days of March we find a tuberous, shortened root-stock, *f* (Fig. 1), bearing at its top two buds, one large and strong, *c*, the other small, *b*; between these is a scar, *a*, which indicates the position of last year's flower-stalk or scape. The smaller bud, *b*, contains only leaves, the large, prominent one, *c*, contains all the leaves and all the flowers of the coming spring. These were already evident in the fall, but they remained undeveloped during the winter in order to flower the coming spring. The root-stock, *f*, will perish after flowering this year, but the continuation of it, bearing the







leaves and flower-scape, *g*, of the season, will produce roots, and, at is summit, a continuation of its axils bearing the leaves and scape of next year. Thus it becomes evident that each growth of the root-

stock remains but two seasons, one while it bears leaves and flowers, and another while it serves as a reservoir in which to lay up a supply of food.

After the second year a constriction takes place between the effete biennial rootstock and the growth above it which at last results in their entire separation, leaving a scar at the point of attachment, *e*.

The peculiar feature of this plant, however, is this: The lower axils of the leaves in early spring contain leaf-buds, at the base of which in each case we find but one root, so that in this case the roots preserve the phyllotaxy of the leaves, since they agree with the position of the buds which are in the axils of the leaves. The roots of these leaf-buds, *d*, remain for one year attached to the parent plant and serve them as suppliers of sap. When, after the second year, this portion of the parent stem decays, the roots are separated from it, but carry with them the still quite undeveloped buds (Fig. 4), which are capable of forming a new plant. I know of no parallel case. The phyllotaxy is $\frac{5}{13}$, or occasionally $\frac{3}{8}$. I consider the scape as the end of the rootstock, the two buds being axillary, the upper one the larger. This would make it a case of sympodial growth.

EXPLANATION OF THE FIGURES.—Fig. 1. The plant in March. Fig. 2. Section showing the position of buds and last year's scape. Fig. 3. Longitudinal section. Fig. 4. The roots after separation. Fig. 5. Plant divested of scales and leaves. Fig. 6. Section of the last. *a*. Last year's scar. *b*. Small leaf-bud. *c*. Bud containing the scape. *b'* and *c'*. The same in the young shoot. *d*. Bud falling away with root. *e*. Scar left by the falling off of the portion of the root-stock more than two years old. *f*. Two years old. *g*. One year old portion. *h*. The scape.

Dayton, Ohio. A. F. FOERSTE.

Notes from Southern New Jersey.—The following plants, collected in 1883, are not given in the Preliminary Catalogue of the State, and may therefore be worth noticing:

Chionanthus Virginica, L.—This is an addition to the flora of the State; locality, near Buena Vista Station, N. J., and Atlantic City R. R. Rare, but probably occurs more frequently in a locality called "Thick Hole," Cumberland Co.

On July 4th I collected in Stephen's Creek, near Estellville, Atlantic Co., *Potamogeton Oakesianus*, Robbins. I am not aware that this plant has been reported from New Jersey before.

Perhaps the only definitely known locality in the State for *Scleria reticularis*, Michx., is near Main Road Station, N. J. S. R. R., seemingly not very abundant.

C. A. GROSS.

Note on Æcidium Bellidis.—The *Æcidium* upon the common daisy, which has hitherto been regarded as a spore-form of *Puccinia Compositarum*, is a true heterocismal uredine. A series of experimental cultures which I have made during the past four months has demonstrated the fact that *Æcidium Bellidis* is one stage of *Puccinia obscura*, Schröt., which occurs on *Luzula*. The *P. Luzulæ* Lib., is a totally distinct species having smooth, elliptical uredospores. Those of *P. obscura* are round and rough.

King's Lynn, England. CHARLES B. PLOWRIGHT.

An Abnormal Form of Carya porcina, Nutt.—The accompanying Fig. 1 represents a longitudnal section between the two valves, and shows the hull, shell and kernel-zones of a nut from an abnormal form of *Carya porcina*. The hull breaks off abruptly into a neck which is often half an inch long. There is a long point of the shell projecting into the neck of the husk. The husk of this form splits at maturity into only two valves, one of which is entire and covers from two-fifths to one-half of the nut. The other valve varies from three-lobed, to three-parted, but the lobes are always grown together at the base. There is a prominent ridge, which runs around the nut between the valves, and which in some specimens amounts almost to a wing. There are also lesser prominences. A cross-section of the nut would have the appearance of a semi-circle attached to a semi-hexagon. The nut has a wrinkled appearance. The hull is cinereous in color or pale green. The leaves are glabrous, and large for this species, and of a darker green than those of the common form.

Fig. 1.

Fig. 2.

The specimens were found on a tree in the campus of the Arkansas Industrial University, and near a tree with nuts of the forms represented in section in Fig. 2.

Fayetteville, Ark. F. L. Harvey.

Botanical Notes.

The Formation of Gum in Trees.—Sir James Paget has drawn attention in the *Medical Times* to some remarkable investigations made by Dr. Beijerinck in connection with the formation of gum in trees, and lately published by the Royal Academy of Sciences at Amsterdam. Dr. Beijerinck found that in the peach, apricot, plum, cherry, or other trees bearing stone-fruits, the formation of gum may be caused by inserting a portion of the gum under the edge of a wound through the bark. The observation that heated or long-boiled pieces of gum would not produce this effect, and that wounds made in the bark of the tree did not produce gum unless a portion was first introduced into it, led him to suspect that the formation of gum was due to the presence of bacteria or other living organisms. On microscopical investigation he found that only those pieces of gum containing spores of a highly organized fungus, belonging to the *Ascomycetes*, had the power of conveying the gum disease or gummosis, and that these spores, inserted by themselves under the bark, produced the same pathological changes as did the pieces of gum. The fungus has been examined by Professor Oudemans, who has ascertained it to be a new species, and has named it *Coryneum Beijerinckii*. Its chief characters consist in the fact that it has a cushion-like stroma, com-

posed of a bright brown parenchyma, on which stand numerous conidia having colorless, unicellular and very slender stems, about as long as themselves. The conidia are small, cask-shaped, about one-third of a millimetre in length, and usually divided by slightly constricting septa into four cells, of which the two terminal are longer than the two middle ones. From these cells germinal filaments may proceed, from which are developed brown, thick-walled and many-celled mycelia. The first symptom of the gum disease is the development of a beautiful red color around the wound, due to the formation of a red pigment in one or more of the layers of the cells of the bark. Dr. Beijerinck believes that the fungus produces a fluid of the nature of a ferment, which penetrates the adjacent structures, since the disease extends beyond the parts in which any trace of the fungus can be detected. This ferment he believes to act on the cell-walls, starch granules and other constituents of the cells, transforming them into gum and even changing into gum the *Coryneum* itself. The influence of this fluid is also exerted in the cambium, causing the formation of morbid parenchyma, the cells being cubical or polyhedral, thin-walled and rich in protoplasm which is in its turn transformed into gum. It is further stated that "a similar disease produces gum arabic, gum tragacanth, and probably many resins and gum-resins." Gum tragacanth is known to be produced by the pith as well as the bark of the stem, and to ooze out from the pith when the stem is cut; and if it be indeed due to a disease it would seem as if the disease infects the whole plant. Gum, moreover, may be found in the uninjured husk of the almond, and it seems at first sight more probable that the irritation caused by a fungoid parasite should cause a greater flow of the natural product, just as the irritation caused by an insect causes the development of galls.

Tuberous Species of Solanum.—A paper upon this subject was read by J. G. Baker at a meeting of the Linnean Society on January 17th.

There have been about nine hundred species described as belonging to the genus, which, however, Bentham and Hooker would reduce to about seven hundred. Only a very small proportion of these has tuberous underground stems, this section including, according to Dunal's monograph in De Candolle's 'Prodromus,' twenty species, all natives of the South American continent, and as far north as Mexico and Texas. These twenty species Mr. Baker thinks should be reduced to six, with well-marked specific characters. While, from a botanical point of view, the range of *Solanum tuberosum* has been unduly narrowed by separating from it forms which are not specifically distinct, from a popular point of view it has, on the other hand been erroneously extended, from the fact that the late Mr. Darwin, in his 'Voyage of the Beagle,' described the potato as growing as far south as 50° S. lat. But Mr. Baker has clearly determined that the species gathered there by Mr. Darwin was not *Solanum tuberosum*, but a quite distinct species, *S. Maglia*. The geographical range of the true *S. tuberosum* extends from Chili to Mexico, though it is doubtful to what extent it is native in equatorial regions, having been cultivated from time immemorial by the Indians. Besides *S. Maglia*, the most important of the tuberous species are *S. Commersoni*, widely dispersed

through Uruguay and Paraguay, and *S. Jamesii*, a native of New Mexico. The tubers of the later species are, however, very small, not much larger than a hazel-nut. The remaining species are but little known, and probably are of no economic value.

Mummy Garlands.—In *Nature*, Dr. G. Schweinfurth gives an account of some new botanical discoveries made by him in connection with the mummies of the twenty-first Egyptian dynasty, found at Deri-el-Bahan. In the floral wreath on the mummy of the Princess Ugi-Khouni were found folded leaves of a willow, *Salix Safsaf*, perfect flowers of the corn-poppy (*Papaver Rhœas*, var. *genuina*), flower-heads of *Centaurea depressa* and of *Picris coronopifolia*. The flowers of *P. Rhœas* appear to have been gathered in an unopened condition to prevent the petals from falling, and are in so good condition that Dr. Schweinfurth remarks that so perfect and well-preserved specimens of this fragile flower are rarely to be met with in herbaria. It is worthy of note, too, that the character of this variety of the poppy, var. *genuina*, although gathered more than three thousand years ago, are identical with those of the same variety known at the present day. With respect to *Picris coronopifalia*, the author remarks that not a single peculiarity is apparent by which it might be distinguished from the recent small form with low spreading branches now so common on the outskirts of the desert. From the occurrence of this flower in the wreaths it is possible to conjecture that the burial of the princess took place in March or April, since there would have been considerable difficulty in obtaining the flowers after the latter month. It has also been determined by capsules of the linseed plant found in a Theban tomb of the twelfth dynasty, 2,200–2,400 B.C., that the flax used by the ancient Egyptians was derived from *Linum humile*, Mill., and that the mustard oil used by them was derived from one of the two varieties of *Sinapis arvensis*, viz., *S. Allionii*, Jacq., or *S. turgida*, Del., both of which are still common in Egypt.

Solid Pigments in Cell-sap.—The petals of flowers are far more often colored by a pigment soluble in the cell-sap than by one in a solid, granular form. Of 200 species examined by P. Fritsch, only 30 contained solid pigments in the cells either of the petals or of the fruits.

Far the most common of these solid pigments is yellow, much the greater number of yellow flowers, including nearly all the yellow Compositæ, being indebted for their color to substances of this nature. Exceptional instances of soluble yellow pigments occur in the petals of *Dahlia variabilis*, *Althæa Sieberi* and *Tagetes*, and in the hairs of many species. Solid yellow pigments are described in *Impatiens longicornu*, where they vary greatly in size and form, in *Tropæolum majus*, where the various shades of color in the flower are due to a substance of this description in a brown cell-sap, in *Œnothera biennis*, *Cerinthe aspera*, *Calendula officinalis*, *Tagetes glandulifera*, *Viola tricolor*, *Rudbeckia laciniata*, *Digitalis ambigua* and *Salpiglossis variabilis*. The particles of the pigment are often in a state of active molecular movement; they are always colored green by iodine and are soluble in concentrated sulphuric acid with a deep blue color. In some other chemical reactions they vary. The pigment appears

to be always imbedded in a matrix of protoplasm. A solid red pigment was observed in the fruits of *Rosa canina*, *Pyrus aucuparia*, *Convallaria majalis*, *Bryonia dioica* and in the acid of *Euonymus latifolius* and *Europæus*, *Celastrus scandens* and *Taxus baccata*.

The red pigment in the cortical portion of the root of the carrot is of a very peculiar kind, resembling long, pointed crystals.

Insoluble violet pigments are rare, but occur in *Thunbergia alata* and *Delphinium bicolor;* while blue granules are found in the fruit of *Viburnum Tinus*. Brown insoluble pigments were found only in the seaweeds, *Fucus vesiculosus* and *Furcellaria fastigiata*. The development of the colored granules does not end with their acting as pigments; after this period they go through a variety of changes of development or degradation. (*Journ.* Roy. Micros. Soc., from Pringsheim's Jahrb.).

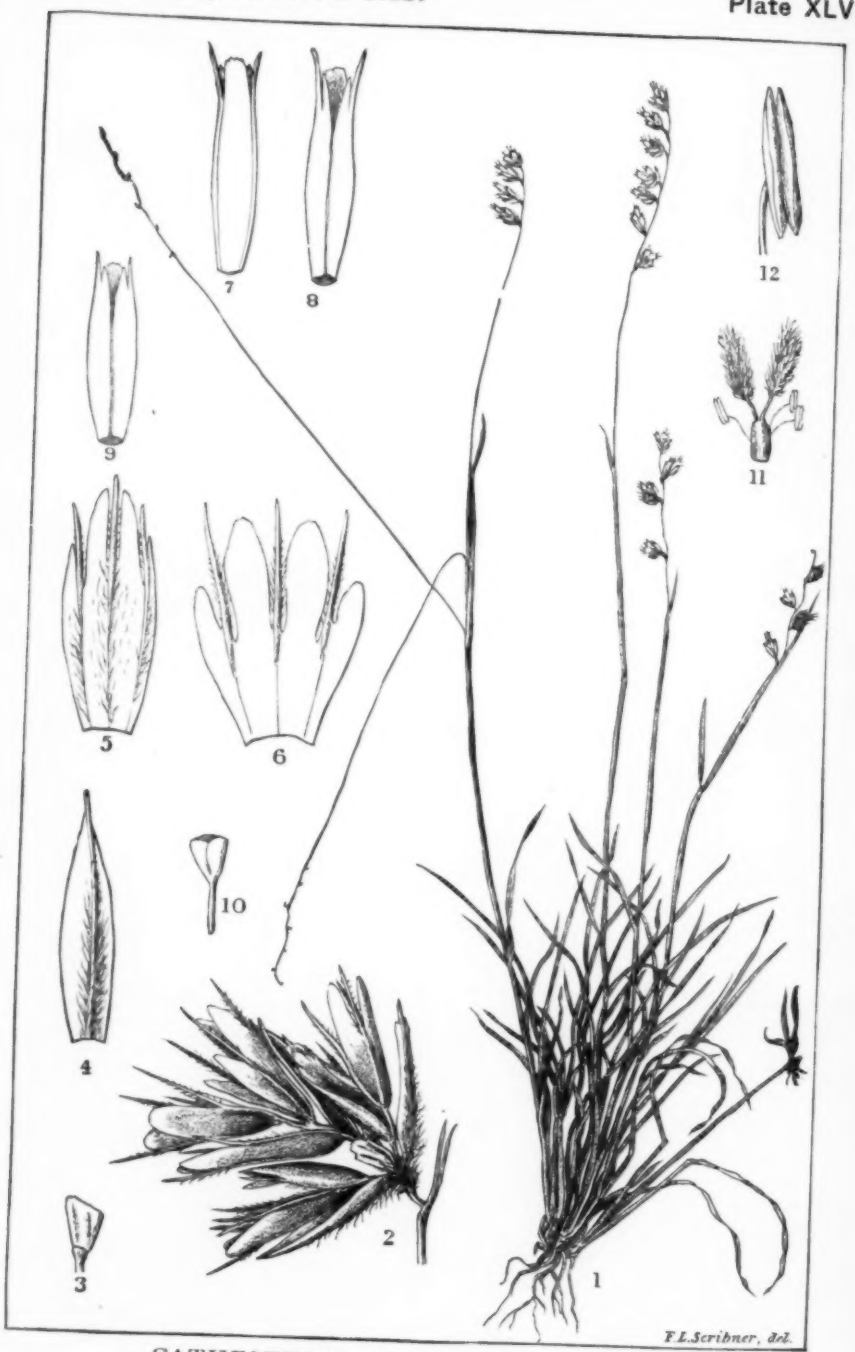
Proceedings of the Torrey Club.—At the regular meeting of the Club Tuesday evening, January 8th, the President occupied the chair and twenty persons were present. The following officers were elected for the current year: President, J. S. Newberry; Vice-President, Addison Brown; Corresponding Secretary, Miss Maria O. Steele; Recording Secretary, A. Hollick; Treasurer, W. H. Rudkin; Editor, W. R. Gerard; Associate Editor, Benj. Braman; Curator, Miss E. G. Knight; Librarian, N. L. Britton. The annual reports of the various officers were read and accepted.

Dr. Britton exhibited specimens and read

A List of Plants collected by Mr. J. Albert Rudkin during a trip from Juno, on the coast, to Mt. St. Elias, Alaska, in the summer of 1883, as follows:—

Coptis asplenifolia, Salisb.; *Aconitum Napellus*, L., var. *delphinifolium*, Seringe; *Claytonia Siberica*, L.; *Spiræa Aruncus*, L.; *Geum macrophyllum*, Willd.; *Rubus Nutkanus*, Moçino; *Rubus pedatus*, Smith; *Poterium Sitchense*, Watson; *Tiarella trifoliata*, L.; *Tellima grandiflora*, Dougl; *Epilobium coloratum*, Muhl.; *Epilobium latifolium*, L., var. GRANDIFLORUM *n. var.*—Stems strong, angled, their upper portions slightly canescent; leaves ovate-lanceolate, two and one-half inches long by one inch wide, bearing small, obtuse, remote teeth; veins very apparent on the lower surface; flowers two inches broad when expanded; petals obovate, obtuse, three-quarters of an inch broad; peduncles axillary, canescent, erect, one inch long; pods woolly erect, truncate, about as long as the peduncles. A well-marked variety, probably not specifically distinct. There is a specimen of the same in the Torrey Herbarium from Sitka.

Fatsia horrida, Benth. & Hook.; *Cornus Canadensis*, L.; *Valerianella sylvatica*, Richardson; *Nabalus alatus*, Hook.; *Pyrola secunda*, L.; *Gentiana Douglassiana*, Boug.; *Romanzoffia Unalaschensis*, Cham.; *Mimulus luteus*, L.; *Spiranthes Romanzoviana*, Cham.; *Habenaria dilatata*, Gray.; *Prosartes trachycarpa*, Watson; *Tofieldia glutinosa*, Willd.; *Eriophorum polystachyon*, L., var. *angustifolium*, Gray, a form with only two or three spikes; *Equisetum pratense*, L.; *Lomaria Spicant*, L.; *Phegopteris Dryopteris*, Fée; *Phegopteris polypodioides*, Fée.; *Aspidium spinulosum*, Swartz, var. *dilatatum*, Eaton, a small form; *Lycopodium Selago*, L.



CATHESTECHUM ERECTUM, V. & H.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XI.] New York, April, 1884. [No. 4.

A new Species of Grass.

By GEO. VASEY.

(Plate XLV.)

In 1830 Presl published in the first volume of Reliquiæ Haenkeniæ a description and figure of a Mexican grass which he called *Cathestechum prostratum*, which has not been since collected, and which is doubtfully admitted by Bentham and Hooker in the Genera Plantarum. In the herbarium of the Department of Agriculture are specimens of a grass collected by Dr. E. Palmer in Sonora, Mexico, in 1869, which has, until recently, remained undetermined. In 1882, however, I received from Dr. Havard specimens of the same grass collected at Presidio, Western Texas, and again in 1883 specimens collected in Presidio County. These specimens I finally concluded to be the long lost *Cathestechum* and sent specimens of them to Prof. E. Hackel of St. Poelten, Austria, who compared them with the original specimens of Presl in the Herbarium at Vienna, and decided that although they were of the same genus they were a different species, for which he proposed the name of *C. erectum*, Vasey and Hackel, and pointed out the differences between the two. Mr. Scribner ascertained that the same grass was collected on the Mexican Boundary Survey. As I am not yet prepared to separate the generic and specific characters, I give the full description as follows:

CATHESTECHUM ERECTUM, Vasey and Hackel.—Culms tufted, erect, 6 to 9 inches high, throwing out from the base long arched runners, of 2 or 3 joints, the joints villous and bearing a tuft of short leaves. The leaves are mostly at the base 2 to 3 inches long, narrow, plane or becoming somewhat involute, sparsely hairy on the margins, striate. Culm-leaves 2 or 3, distant, 1 to 2 inches long; ligule a ciliate ring.

Some of the culms are simple, and others develop at the upper sheath 2 to 4 lateral peduncles, each 2 to 4 inches long, forming a kind of cymose cluster. Each of these peduncles, as well as the main stem or rhachis, bears a raceme, about one inch long, of from 5 to 9 approximate, sessile fascicles of flowers. Each fascicle consists of three (rarely 4) spikelets. The lateral spikelets of each fascicle are 2-flowered, the middle spikelet usually 3-flowered, frequently with a fourth imperfect flower. Sometimes also the lateral spikelets have a sterile pedicel or an imperfect flower. The outer glumes are colored and very unequal; the lower one is minute (one-half line long), broadly cuneate, truncate or somewhat toothed at the apex; the upper one is lanceolate, compressed, somewhat keeled, 1-nerved, acute, or in the central spikelet 2-toothed and mucronate, 1 to 1.5 line long, villous externally. The flowering-glumes are oblong, about 1.5 line

long, 4-lobed, with the nerves extended into awns between the lobes, the awns as long as, or in the central spikelet considerably longer than, the lobes. The lobes in the lateral spikelets hardly extend to the middle; in the central spikelet they extend half or two-thirds the length of the glume. The awns are either naked or ciliate, at least below. The palet is oblong-lanceolate, as long as its glume, 3-toothed or 3-lobed at the apex, and the two nerves in the central spikelet are extended into awns slightly longer than the teeth or lobes.

Presl's description says the flowers are all hermaphrodite; in our species my examinations lead me to think that only the lower flower of each spikelet is perfect. The genus is evidently related to *Ægopogon* and *Hilaria*, and by Bentham and Hooker is placed with them in the tribe Zoysieæ of the section Panicaceæ, to which they belong by virtue of the disarticulation of the flowers below the outer glumes. It has also affinity with the sub-tribe Pappophoreæ of the tribe Festucaceæ, where it was placed by Kunth, and where Mr. Hackel thinks it belongs.

I am indebted for the drawings illustrating this article to Prof. W. J. Beal, for whom they were made by Mr. F. L. Scribner to illustrate a proposed work on grasses.

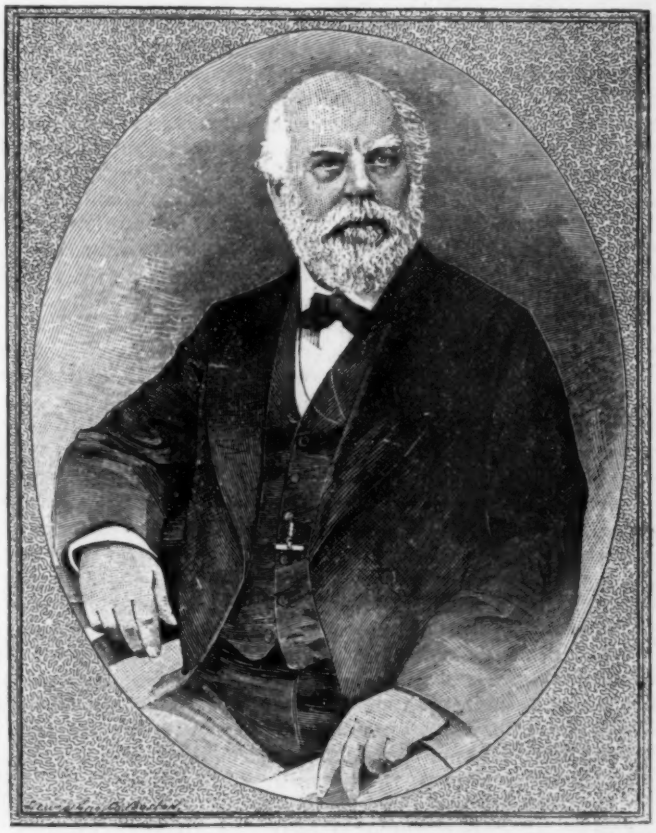
EXPLANATION OF PLATE XLV.—Fig. 1. *Cathestechum erectum*, V. and H., natural size. Fig. 2. One of the terminal clusters of three spikelets, showing the prolongation of the main axis, much enlarged. Fig. 3. Lower empty glume. Fig. 4. Upper empty glume. Fig. 5. Flowering-glume of first floret. Fig. 6. Flowering-glume of second floret. Figs. 7 and 8. Palea of the first floret, dorsal and anterior views. Fig. 9. Palea of the second floret. Fig. 10. Terminal rudimentary floret of the spikelet. Fig. 11. Pistil, with the imperfect stamens of the lower floret. Fig 12. A perfect stamen of one of the upper florets. (Figs 3 to 10 inclusive are enlarged on the same scale.)

George Engelmann.

George Engelmann was born in Frankfort-on-the-Main on the 2d of February, 1809, and died in St. Louis just after the completion of his seventy-fifth year, on the 4th of February, 1884, after an illness which had kept him from his scientific work but a few days.

Dr. Engelmann received his medical education and early scientific training at Berlin, Heidelberg and Frankfort. Agassiz, Alexander Braun, and Charles Schimper were among his college-associates and lifelong friends. He left Germany almost at once after his graduation, reaching New York in 1832. His first visit was to Philadelphia, where he was fortunate enough to make the acquaintance of Nuttall and other scientific men. His inclinations turning westward, he soon left the seaboard to seek a home in the almost unexplored regions beyond the Mississippi. He first went to St. Louis, but did not at once establish himself there. Desiring to see something of the western country before selecting a home, he undertook a long and solitary journey on horse-back through South-western Missouri, Arkansas and Western Louisiana. This journey, probably made in 1833, occupied six months. It nearly cost Dr. Engelmann his life, for he took a dangerous fever among the Arkansas swamps, into which his botanical zeal, no doubt, often led him. Fortunately he fell into the hands of a negro family, which nursed him faithfully through a long illness

that cut short further exploration and hurried him back to St. Louis. Here he finally established himself as a physician in 1835. He had previously, however, gone to Germany, and, on his return, brought back with him to his new home the faithful and devoted companion who shared his labors, his trials and triumphs, for more than forty years. From 1835 until his death Dr. Engelmann continued to live



in St. Louis and to devote to scientific investigations every moment which could be spared from a large and absorbing professional practice.

Engelmann's first botanical publication appeared in 1832, when he printed in Latin a *dissertatio inauguralis*, "De Antholysi prodromus," illustrated with drawings made by its author. No other botan-

ical paper appeared from his pen until 1842, when he published in the *American Journal of Science* his monograph of North-American Cuscutineæ.

The appearance of this monograph, which was soon republished in the *Botanische Zeitung* and the *London Journal of Botany*, established Engelmann's reputation as a systematic botanist and procured for him the correspondence of Hooker and other foreign botanists. Several new species were described in this paper, and the genus *Lepidanche* was proposed for a *Cuscuta*-like plant of the western prairies. *Cuscuta* always interested Dr. Engelmann, and in 1859 he published in the *Transactions* of the St. Louis Academy an elaborate revision of the whole genus, for which he had long been collecting material.

In 1844 he published in the *American Journal of Science* a list of plants collected by Charles A. Geyer in Illinois and Missouri, in which several species were first described; and in 1845, in the *Journal* of the Boston Society of Natural History, in collaboration with Asa Gray, an enumeration of plants collected in Western Texas by his countryman, Ferdinand Lindheimer, a naturalist attached to the German colony of New Braunfels.

In 1848 was published his account of the plants collected on Dr. A. Wislizenus's expedition. The study of this collection exerted a powerful influence upon his subsequent botanical studies. It first drew his attention to Cactaceæ and *Pinus*, which continued to occupy his thoughts for the remainder of his life, and of which his knowledge was unequalled. As early as 1856, Dr. Engelmann published in the *Proceedings* of the American Academy a synopsis of the Cactaceæ of the territory of the United States. Two years later appeared his "Cactaceæ of the Boundary," in the second volume of the United States and Mexican Boundary Survey report. This paper, superbly illustrated with drawings made (under Dr. Engelmann's direction) by Roethe, is, perhaps, his best-known botanical work. Dr. Engelmann studied and described all the collections of Cactaceæ which, from time to time, were made in the Mexican boundary region, and, had he lived, would have elaborated the whole order in accordance with his latest views of the subject. He even proposed so late as last year to pass a considerable time in Northern Mexico for the purpose of studying these plants in their native country before finally giving to the world the final results of his long investigations.

Other difficult genera were studied by Dr. Engelmann. His predilections, indeed, were always for the most difficult and perplexing plants, and he willingly devoted himself to such genera only as less patient investigators hesitated to take up. Thus he mastered the North-American Euphorbiaceæ, elaborating all recent collections of the family, without, however, undertaking a complete revision of the order as represented in this country. He published an elaborate and exhaustive paper upon the North-American species of *Juncus*, and, later, one on the North-American *Isoëtes*. His published notes upon the North-American species of *Quercus*, and upon North-American *Abies*, *Juniperus* of the section Sabina, and upon the genus *Pinus*, contain the most valuable and trustworthy information that has appeared upon these plants. In 1873 he published, under the

title of "Notes on the genus *Yucca*," his elaborate revision of the genus here first comprehensively treated. Two years later appeared his notes on *Agave*, in which are enumerated and described the species detected within the limits of the United States, as well as a few foreign species previously imperfectly known. For many years Dr. Engelmann studied the genus *Vitis*, and our knowledge of the North-American species of this is due in a large measure to his investigations. His last botanical publication, a sketch of the true grapevines of the United States, although written some months earlier, and previous to his last European journey, was issued late in 1883.

Dr. Engelmann's botanical writings were not voluminous. All his work, however, is characterized by the most careful and conscientious preparation, great, good judgment, classical methods of treatment, and remarkable thoroughness. His investigations were slow and laborious, often lasting for years in the case of a single plant. No botanist was ever less anxious to publish prematurely the results of his observations, or was less satisfied with the results of his own knowledge. So admirable, and in these days unusual, caution has made Dr. Engelmann's botanical writings masterpieces in their way, worthy to stand with the best productions of their nature which have yet appeared. This very caution and desire to wait for completeness, however, which has made Dr. Englemann's published papers what they are, has cost the world a vast store of valuable information collected by him during long years of careful investigation, but never quite ready, in his critical judgment, for publication.

Dr. Engelmann, in addition to his professional and botanical labors, was a most zealous meteorological observer, and, at the time of his death, was probably one of the oldest meteorologists in the United States. His meteorological and other miscellaneous papers, as well as his important botanical ones since 1859, have been published in the *Transactions* of the St. Louis Academy of Science, which he was largely instrumental in establishing, and which he long served as president.

Dr. Engelmann was a member of the American Academy of Arts and Sciences, a corporate member of the National Academy of Sciences, a foreign member of the Linnean Society of London, and an active or corresponding member of many other learned bodies. He long enjoyed the friendship, the respect and the correspondence of many of the most distinguished botanists of the age, everywhere the recognized authority in those departments of his favorite science which had most interested him.

(For this account of Dr. Engelmann's life and labors, and for the engraving which illustrates it, we are indebted to our cotemporary, *Science*.)

New North American Fungi.

By J. B. Ellis and B. M. Everhart.

Peziza (Mollisia) fumigata.—Densely gregarious, minute (.13–.16$^{mm.}$) sooty-black; disk nearly plane, scarcely margined, minutely papillose; asci oblong-cylindrical, 50 x 7μ; paraphyses thickened above; sporidia oblique or biseriate, oblong, 2–3-nucleate, hyaline,

slightly curved, 9–12 x 3μ. Texture of the cups fibrous, the fibres bearing at their free ends minute, oblong or subglobose brown conidia.

On rotten wood of *Magnolia*, Newfield, N. J., Oct., 1883.

SCHIZOXYLON MONILIFERUM.—Cæspitose, 4–6 individuals clustered together; disc about 1.5$^{mm.}$ across, covered by the cinereous, thin inner membrane, which is soon perforated in the centre, revealing the pallid hymenium; margin of the outer membrane briefly reflexed and imperfectly toothed; asci 250–300x6–8μ surrounded by numerous paraphyses; sporidia filiform nearly as long as the asci and very easily separating into many globose joints about 1.15μ in diameter.

On dead and dry wood of oak (*Quercus coccinea* and *Q. alba*), mostly on some old wound or where a limb has been broken off. At first buried in the wood, except the disk, but at length more or less exposed (by the decay of the wood?) and then black outside.

Newfield N. J.; autumn and winter.

LEPTOSPHÆRIA PHYSALIDIS.—Perithecia minute, depressed-globose, of coarse cellular structure, with a rather broad opening above; asci 35–40x7–8μ without paraphyses; sporidia biseriate, fusiform, slightly curved, yellowish, 3-septate, 15–19x3μ.

On dirty, white, round spots on leaves of *Physalis pubescens*, with *Entyloma Physalidis*, Winter. Near Lexington, Ky., Aug. 1883, Prof. W. A. Kellermann.

SPHÆRIA (TEICHOSPORA) MURICATA.—Perithecia gregarious or scattered, hemispherical, .33–.5$^{mm.}$ in diameter, muricate-roughened and often obscurely radiate-striate around the prominent, very slightly compressed ostiolum, slightly pruinose, olivaceous when fresh, black and collapsed when dry; asci cylindrical, with stout, granular paraphyses 2.5–3μ thick; sporidia elliptical, brown, 3-septate, with one or more imperfect, longitudinal septa, 18–25x10–11.5μ.

Differs from *T. pezizoides*, S. & S., in its larger, rougher perithecia and its larger asci and sporidia.

On bark. San Diego, Cal.; leg. C. R. Orcutt, com. C. J. Sprague.

ANTHOSTOMELLA OSTIOLATA.—Perithecia single or 2–4 together, .33–.5$^{mm.}$ in diameter, nearly buried in the unchanged inner bark, but with their upper part distinctly prominent though closely covered by the blackened epidermis, which is pierced by the short, stout ostiolum; asci cylindrical, 80–85x7–8μ, with linear paraphyses; sporidia obliquely uniseriate, oblong-elliptical, brown, 1–2-nucleate, 10–13x4–5μ.

Closely allied to *A. limitata*, Sacc., and *A. intermedia*, Nitschke. The stroma is formed of the unaltered substance of the bark and not limited by any circumscribing line.

SPHÆRIA AQUATICA. — Perithecia scattered, membranaceous, .25$^{mm.}$ in diameter, partly buried in the wood, subglobose or a little elongated; ostiolum papilliform; asci linear, 150x8–6μ with abundant paraphyses; sporidia uniseriate (end to end), oblong, uniseptate and slightly constricted at the septum, straight or slightly curved, pale at first, with a single large nucleus in each cell, at length clear dark brown, 15–20x6–7μ.

Inside a cedar water-pail in constant use; on the bottom and around the lower part of the sides where it must have been almost constantly under water. Newfield N. J., Dec., 1883.

Contributions towards a List of the State and Local Floras of the United States.

MINNESOTA.*

A Catalogue of Plants collected in the North-western Territory by Thomas Say in the year 1823. By Lewis De Schweinitz. (C.)
In Keating's Narrative of Long's Exped. to source of St. Peter's River, Vol. ii., London, 1825.

Botany of the North-eastern Geological District of Minnesota. By Thomas Clark.
In Rep. of State Geologist for 1865.

A Catalogue of the Plants of Minnesota. By I. A. Lapham.
In Rep. of State Hoticult. Soc. St. Paul, 1875.

List of the Ferns of Minnesota. By W. H. Lemard, M.D.
In Bull. Minn. Acad. Sci. Minneapolis, 1877.

The Mycological Flora of Minnesota. By A. E. Johnson, M.D. (C.)
In Bull. Minn Acad. Nat. Sci. Minneapolis, 1877 and 1878. (Additions in same, 1879.)

The plants of the North Shore of Lake Superior. By B. Juni. (C.)
In Ann. Rep. Geolog. Survey for 1878.

Plants of the north shore of Lake Superior. By S. C. Roberts. (B.)
In 8th Ann. Rep. Geol. Survey Minn. Minneapolis, 1879.

List of Trees, Shrubs and herbaceous Plants identified by O. E. Garrison in the region of the head-waters of the Crow-Wing River, the White Earth Reservation, Itasca Lake, and the Upper Mississippi.
In Ann. Rep. Geolog. Survey for 1880.

The wild Flowers of Lake Pepin Valley. By Miss Sara Manning.
In Ann. Rep. Minn. Horticult. Society for 1884.

Fillmore County.

The Trees and Shrubs of Fillmore County. By N. H. Winchell.
In Ann. Rep. Geolog. Survey Minn. for 1875.

Freeborn County.

List of Trees and Shrubs of Freeborn County. By N. H. Winchell. (A.)
In 3rd Ann. Rep. Geol. Survey. St. Paul, 1875.

Hennepin and Houston Counties.

List of Shrubs and Trees. By N. H. Winchell.
In Ann. Rep. Geolog. Survey for 1876.

Mower County.

List of Trees and Shrubs of Mower County. By N. H. Winchell. (A.)
In 3rd Ann. Rep. Geol. Survey. St. Paul, 1875.

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* See also WISCONSIN, p. 131, Vol. x. *A Flora of Minnesota*, to be published as a report of the Geological and Natural History Survey next autumn, will include not only the observations of the State Geologist and his assistants, but also those of earlier botanic collectors and explorers, enumerating all the species that are known to have been found in Minnesota by all observers up to the present time (about 1,550 species of phænogams and vascular cryptograms, of which 126 are introduced species; about 100 are western and northern plants not described in Gray's *Manual;* and, for all these, quoted specific descriptions will be appended, with citation of the author.) The geographical range of each species will be stated, so far as it pertains to Minnesota; and its abundance, frequency, or rarity, be noted. In the case of rare or local species, the localities and names of observers will be mentioned.—WARREN UPHAM.

Olmsted, Dodge and Steele Counties.
List of Shrubs and Trees. By M. W. Harrington.
In Ann. Rep. Geolog. Survey Minn. for 1875.
Ramsey County.
List of Shrubs and Trees. By N. H. Winchell.
In Ann. Rep. Geolog. Survey for 1877.
Rice County.
List of Shrubs and Trees. By L. B. Sperry.
In Ann. Rep. Geolog. Survey for 1877.

IOWA.

A Catalogue of the indigenous Forest Trees of Iowa. By C. A. White, M.D. (A.)
In Rep. Geol. Survey of the State, p. 138. Des Moines, 1870.
Contributions to the Flora of Iowa. By C. E. Bessey. (B.)
In 4th Bien. Rep. Iowa Agric. College, Des Moines, 1871.
Contributions to the Flora of Iowa; a Catalogue of the phænogamous Plants. By J. C. Arthur. (A.) 8vo, pamphlet, pp. 44, Charles City, 1876. Additions in Proc. Davenport Acad. Sci.
List of species of Fresh-water Algæ found in Iowa. By C. M. Hobby, M.D. (A.)
In Proc. Iowa Acad. Sci., Iowa City, 1875–1880.
Scott County.
List of phænogamous Plants collected in the vicinity of Davenport, Iowa, during 1870 to 1875. By J. J. Nagel and J. G. Haupt. (A.)
In Proc. Dav. Acad. Sci.

MISSOURI.

Catalogue of the trees and Shrubs of Missouri. By G. C. Swallow. (B.)
In 2nd Ann. Rep. Geol. Survey, p. 221, Jefferson City, 1855.
Systematic View of Plants gathered on a Tour on the Missouri. By Maximilian Prince of Wied. (C.)
4to, London, 1843.
Trees, Shrubs and Vines of Missouri. By G. C. Swallow.
In 1st Ann. Rep. Comm. Statistics to the General Assembly of the State of Missouri, p. 112, Jefferson City, 1867.
Jackson County.
Flora of Jackson Co. By Frank Bush. (B.)
8vo, pamphlet, pp. 16, Independence, 1882.

NEBRASKA.

List of Nebraska Carices. By Chester Dewey. (B.)
In Trans. Amer. Philos. Soc., Vol. xii., Philadelphia, 1863.
Catalogue of the Flora of Nebraska. By Samuel Aughey.
Publ. by University of Nebraska. 8vo, pp. 37, Lincoln, 1875.
List of Forest Trees and Shrubs of Nebraska, with notes on their distribution. By Samuel Aughey. (B.)
In Sketches of Phys. Geog. and Geol., Nebraska, Omaha, 1880.

KANSAS.

Catalogue of Kansas Plants. By J. W. Carruth. 8vo, pamphlet, pp. 29, 1872.
Centennial Catalogue of the Plants of Kansas. By James W. Carruth. (B.)
In Proc. Kans. Acad. Sci., Vol. v., Topeka, 1877.

W. R. G.
N. L. B.

Notes on Mertensia Virginica DC.—In the BULLETIN for May, 1880, I announced my discovery of *M. Virginica* as indigenous to New Jersey, it being plentiful on the bank of Crossick's Creek, near the mill at Walnford in Monmouth County. The plant has been long established, and is found in various places along the stream for a mile or two north and south of Walnford. I have to announce a new and richer station for this plant on the Raritan River in Somerset County, having received from Miss Sarah E. Veghte an elegant specimen of it. She writes: "This flower is found in great abundance in many places along the Raritan River. This specimen was taken from woods about one mile and a half west of the village of Raritan, opposite the summer residence of Secretary Frelinghuysen."

Abnormal form.—Three years ago I transferred some good roots from Walnford to my garden, but not until last spring did they bear any perfect flowers, and then not in their wild profusion, nor did they mature any seeds. One of the plants gave flowers nearly every one of which was prettily abnormal. Instead of the normal form, on the smooth tube of the flower several wart-like bosses or spurs were developed. Some of the flowers had five of these protuberances, according with the pentamerous mouth of the trumpet. The very effect was odd, but decidedly pretty. I hoped to get seeds in order if possible to perpetuate the form, but failed. I should add that the outer sides of the long throat or tube of the abnormal flowers were as many-sided as there were bosses.

SAMUEL LOCKWOOD.

Mertensia Virginica.—A propos of Dr. Lockwood's note, I would state that the Virginian cowslip is represented in the herbarium of the Philadelphia Academy by specimens from "meadows between Bordentown and Lamberton." Mr. A. C. Apgar reports it from Somerville and Raritan, and Miss Veghte, of South Branch, states that it grows plentifully along the Raritan in Somerset County. It therefore seems quite certain that it is indigenous to New Jersey.

N. L. BRITTON.

Note on Some New Species of Grasses.—In the January number of the BULLETIN (1884), under the article New North American Grasses, three species of *Boûteloua* are described, viz: *B. trifida*, Thurb., *B. Burkii*, Scribn., and *B. Havardi*, Vasey—which were characterized and published by Mr. Sereno Watson in his list of Palmer's plants in Vol. xviii. of the *Proceedings* of the American Academy of Arts and Sciences, issued August 15th, 1883.

In justice to myself I wish to state that my article in the BULLETIN was written in April, 1883. and was placed in the hands of the editor May 22d following.

Bouteloua pusilla, Vasey, ined., published by myself in the January BULLETIN, is certainly the same as No. 751 Bourgeau and No. 1,016 Schaffner, referred by Mr. Watson in his list of Palmer's plants to *B. prostrata*, Lag. (*B. humile*, HBK.)

F. LAMSON SCRIBNER.

New New York Stations.—It may be of sufficient interest to mention in the BULLETIN that in June, 1883, I found well established on a railroad embankment on Coney Island quite a number of specimens of *Asperugo procumbens*, L., and on the northerly side of 155th Street, opposite the Trinity Church cemetery, in New York city, *Barbarea præcox*.

Buffalo, N. Y. DAVID F. DAY.

Necrology.—Samuel Botsford Buckley, Ph. D., died February 18th, 1884, of pneumonia, at his home in Austin, Texas, aged nearly 75 years. He was born May 9th, 1809, in Yates County, N. Y., near Seneca Lake, six miles from Penn Yan and graduated at Wesleyan University, Conn., in the class of 1836. From this period onward he spent much time in the Southern States, then a comparatively new field for the naturalist, collecting plants, shells and insects. His various discoveries in natural science relate exclusively to southern species, in connection with which his name often occurs.

It was not until 1866, however, that he made his home in the South, at which time he was appointed State Geologist of Texas and became a resident of Austin.

In 1841 he discovered in Clarke County, Ala., the skeleton of a *Zeuglodon* seventy feet in length which is now in the Warren Museum at Boston. As a botanist he had no specialty, and his studies were in consequence promiscuous; yet his name will be forever linked with the flora of our country. He aided largely in the preparation of Mrs. Young's "Flora of Texas," and was several years engaged in writing a work on the trees and shrubs of America, which is unfinished. He contributed some papers on new species of ants. Among the new shells found by him in Florida is a beautiful *Unio*, which Dr. Isaac Lea has named *Unio Buckleyi*. Professor Buckley was a member of the Philadelphia Academy of Sciences, and of societies in New York, Buffalo and New Orleans.

Penn Yan, N. Y. S. HART WRIGHT.

Botanical Notes.

A Catalogue of North American Carices has been compiled and recently published by Mr. L. H. Bailey, Jr., of Cambridge, Mass. It includes the names of two hundred and ninety-three species and eighty-four varieties, and is intended as an exchange-list, a check list for herbaria and as a contribution to American caricography. Copies of the catalogue will be given for desiderata.

Parkinson's "Paradisus."—A good many people, we suspect, have experienced difficulty in construing "Paradisi in Sole Paradisus terrestris." The editor of *Aunt Judy's Magazine* and the venerable Rev. H. T. Ellacombe are confessedly among the number, but they have been the means of eliciting from correspondents of *Notes and Queries* the explanation that the title is a wretched pun. "Paradisus" is a park; "Paradisi" is, of course, the genitive of this; "in sole" is in (the) sun (son). Hence the title would run, "The Terrestrial Paradise of Park-in-son." Such punning titles were not uncommon in Parkinson's time.—*Gardeners' Chronicle.*

The Gender of varietal Names.—In answer to the editor of the *Gardeners' Chronicle*, who asked Mr. DeCandolle's opinion as to whether the name of a variety should conform in gender to the generic name when the abbreviation "var." follows the specific, the distinguished codifier of botanical namenclature answers as follows:

"I have sometimes put to myself the same question as to the gender of the names of varieties, and it is most likely that in practice I have resolved it sometimes in one way and sometimes in another, but I have just been looking to the practice of authors of repute, and I observe that, in general, they have made the varietal name conform to the gender of the generic name, thus:

"Nasturtium amphibium, α indivisum, DC., *Syst.*, ii., p. 117.

"Thymus Serpyllum, β montanus, Benth., in *Prodr.*, xii.

"Phyllanthus simplex, β oblongifolius, Müller, in *Prodr.*, xv., &c.

If the word '*varietas*,' or the abbreviation 'var.' be employed, it seems most correct to make the abjective feminine. The use of Greek letters to indicate varieties, thus: α, β, γ, corresponds to the employment of figures, which have no gender. On the other hand, when the idea is expressed by a qualifying 'var.' or '*varietas*,' a sentence is made which must be constructed in the correct grammatical manner. The name of the variety becomes in this case an adjective qualifying '*varietas*,' and should therefore take a feminine termination. English writers generally use the abbreviation 'var.' Linnæus indicated the varieties by the Greek letters, α, β, γ, without, as a rule, adding any other epithet. Continental authors have mainly confirmed to Linnean usage, and do not write 'var.' This is in conformity with the omission of 'gen.' before the generic, or 'sp.' before the specific name."

Relation of Medullary Rays to the Strength of Timber.—At a January meeting of the Philadelphia Academy of Natural Sciences Dr. Rothrock called attention to some experiments made by Mr. Frank Day, in the laboratory of the University of Pennsylvania, on the relation of the medullary ray to the strength of timber. Mr. Day had found that it required just about twice as much force (say 1,130 pounds) to pull apart a square inch of live oak, if the force ran parallel with these rays, as it would if the force were applied at right-angles to them.

What was true of the live oak was also largely true of other timbers. The buttonwood (*Platanus occidentalis*) was remarkable for the development of its medullary rays, and also for the difficulty of splitting the wood at right-angles to them.

Mr. Day's experiments also proved that there existed great differences in the quality of the material of the woody fibre; for in timber where the relative proportion of wood and ducts could well be compared, and where the fibres were of equal size throughout, differences in strength were to be found.

Botanists of short stature will be interested in a statement made in the April *Naturalist* "that no obituary notices of scientific men of a length of a page or less have ever been declined by its editors."

The Syracuse Botanical Club.—During the past year the Syracuse Botanical Club has added over one hundred and fifty mounted

specimens to its Onondaga herbarium, which now contains nine hundred and forty species and varieties of phænogams and acrogens, besides seventy-six mosses. The order best represented in this collection is Compositæ, of which there are a hundred and seven species.

The Club has held fortnightly meetings through the winter for botanical readings and hopes soon to resume its field work.

At its annual meeting, March 15th, the following officers were elected for the current year: President, Mrs. Clark W. Barnes; Vice-President, Mrs. Leonora Goodrich; Corresponding Secretary, Mrs. George Hosmer; Recording Secretary, Miss C. A. Bach; Treasurer, Miss Katie Poole. MARY OLIVIA RUST.

Proceedings of the Torrey Botanical Club.—At the regular meeting of the Club held at Columbia College, Tuesday evening, Feb. 12th, the President occupied the chair and twenty-five persons were present.

The following Committees were appointed for the current year:

Finance Committee.—Addison Brown and J. L. Wall.

Committee on Admissions.—W. R. Gerard and Benj. Braman.

Herbarium and Library Committee.—N. L. Britton, Miss E. G. Knight, A. Hollick and J. S. Brown.

Dr. Newberry continued his account of the vegetation along the line of the Northern Pacific Railroad, describing more particularly on this occasion the shrubs and herbaceous plants.

One person was elected an active member.

At the regular meeting of the Club held at Columbia College Tuesday evening, March 11th, the President occupied the chair and twenty-six persons were present. Messrs. Rudkin, Day and Hollick were appointed a committee on field meetings for the present year.

Dr. N. L. Britton remarked upon a collection of ferns made in recent years by Mr. S. B. Buckley in Texas and Mexico. It included the following species:

Polypodium incanum, Swartz, a small form from rocks in the mountains of Pecos Co., Texas.; *Gymnogramme hispida*, Mett., Lampezas Mountains, Mexico; *Notholæna sinuata*, Kaulf., Pecos Co., Texas.; *N. ferruginea*, Desv., Lampezas Mts., Mexico; *N. candida*, Hook., Pecos Co.; *N. Hookeri*, DC., Pecos Co.; *N. Fendleri*, Kunze, Pecos Co.; *N. dealbata*, Kunze, Austin, Texas.; *Cheilanthes Alabamensis*, Kunze, Austin; *C. microphylla*, Swartz, Austin; *C. leucopoda*, Presl, Lampezas Mts, Mexico; *C. Eatoni*, Baker, Pecos Co., Texas; *C. Lindheimeri*, Hook., Lampezas Mts.; *Pellæa atropurpurea*, Link, *P. ternifolia*, Link, Pecos Co.; *P. Wrightiana*, Hook., Pecos Co.; *Asplenium parvulum*, Mart. and Gal., Austin; *Aspidium patens*, Swartz, Austin; *Lygodium Mexicanum*, Presl, on the Mexican side of the Rio Grande, near Brownsville, Texas.

Dr. Newberry remarked upon the flora of the Cascade Mountains in Oregon, and read extracts from his journal of the expedition to that region in 1855.

ERRATUM.—Page 31 (March number) second line from bottom, read "axis" for "axils."

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XI.] New York, May, 1884. [No. 5.

New Species of Fungi.

By Chas. H. Peck.

Puccinia Comandræ.—Spots pale or yellowish, often confluent; sori abundant, amphigenous, crowded or scattered, orbicular, blackish-brown or black; spores variable, obovate-oblong or elliptical, obtusely pointed, obtuse, truncate or obliquely truncate, .0012 to .0024 inch long, .0008 to .0009 in. broad, with a long colorless pedicel.

Leaves, stem and fruit of living *Comandra pallida*. Washington Territory, T. S. Brandegee.

The sori occur on both sides of the leaf, but they are usually more plentiful on the lower than on the upper surface.

Puccinia Clarkiæ.—*Stylospores*.—Sori minute, orbicular, amphigenous, reddish-brown; spores globose or subglobose, .0009 to .0011 in. in diameter.

Teleutospores.—Sori minute, orbicular, scattered, amphigenous, blackish-brown; spores oblong or obovate, obtuse or obtusely pointed, slightly constricted at the septum, .0016 to .002 in. long, .0009 to .001 in. broad, the pedicel about equal to or shorter than the length of the spore.

Living leaves of *Clarkia pulchella*. Washington Territory, Brandegee.

The sori of the teleutospores occur on the same plant and even on the same leaves as the stylospores, but they are at once distinguished from these by their darker color. Stylospores are sometimes intermingled in the same sorus with the teleutospores.

Puccinia Balsamorrhizæ.—Sori amphigenous, scattered, suborbicular, large or small, black; spores oblong-elliptical, obtuse, scarcely constricted, .0016 to .0018 in. long, .0009 to .001 in broad, with a short pedicel.

Living or languishing leaves of *Balsamorrhiza sagittata*, etc. Washington Territory, Brandegee; Utah, M. E. Jones.

Trichobasis Balsamorrhizæ, *Bot. Gazette*, Vol. v., p. 276, is apparently the stylosporous condition of this species. In the specimens from Washington Territory the stylospores are intermingled with the teleutospores.

Puccinia Solidaginis.—Spots pale, becoming brownish, sometimes confluent; sori large, prominent, amphigenous, scattered or clustered, black; spores oblong, constricted at the septum, pointed or obtuse, .0016 to .002 in. long, .0009 to .0011 in. broad; pedicel colorless, longer than the spore.

Living leaves of *Solidago pumila*. Utah, Jones.

This is clearly distinct from *P. Virgaureæ*, which also inhabits the leaves of certain species of *Solidago*.

ÆCIDIUM PHACELIÆ.—Spots large, suborbicular, pallid or greenish-yellow, becoming brown; peridia hypophyllous, crowded, short, numerous, occupying the entire spot, crenulate on the margin; spores subglobose, orange-yellow, .0008 to .001 in. in diameter.

Living leaves of *Phacelia*. Utah, Jones.

CÆOMA COMANDRÆ.—Spores pale, indefinite; sori amphigenous, clustered, at first covered by the epidermis; spores subglobose, ovate or elliptical, orange-yellow, .00095 to .0014 in. long, .0008 to .00095 in. broad.

Living leaves of *Comandra pallida*. Utah, Jones.

PERICONIA GEOPHILA.—Stem two to three lines high, composed of compacted filaments, smooth, smoky-brown; head hemispherical, pulverulent, little broader than the diameter of the stem, whitish or yellowish-white; spores subglobose, colorless, .0002 in. in diameter.

Ground. Washington Territory, Brandegee.

This species is peculiar in its habitat. By some authors it would be referred to the genus *Sporocybe*, the application of these two generic names having been interchanged by different writers.

DENDRODOCHIUM PALLIDUM.—Tufts small, .014 to .028 in. broad, suborbicular, depressed when dry, whitish or pallid; flocci slender, much branched above, colorless; spores abundant, large, oblong or subcylindrical, straight or slightly curved, obtuse, colorless, .0008 to .0015 in. long, .0004 to .0005 in. broad.

Decaying wood. Canada, Prof. J. Macoun.

The filaments are closely and abundantly, but irregularly branched above, so that the spores, which are terminal on the ramuli, are crowded together as if produced in large masses.

PHYSARUM MULTIPLEX.—Stems growing from a thin, subpersistent hypothallus, sometimes confluent at the base; longitudinally furrowed, equal or tapering upward, orange-red; sporangia small, irregular, numerous, confluent into subglobose gyrose-convolute heads, greenish or yellowish-green, with single walls bearing numerous lime-granules; knot-like thickenings of the capillitium very small, sparse, white or yellowish; spores globose, blackish-brown, .0004 in. in diameter.

Decaying wood and bark. Ohio, Morgan.

The species is related to *Physarum polymorphum*, Mont., from which it is distinguished by its bright orange-colored stem and its very numerous small, confluent, greenish sporangia.

Bees and Colored Flowers.—I noticed recently, in a paper of some pretension to scientific accuracy, that Mr. Darwin has shown that insects are attracted to flowers by their color or fragrance, and, therefore, anemophilous flowers are not visited by insects; and Mr. Darwin's experiment with the *Lobelia* was cited in which no flower was visited subsequent to the cutting off of the petals. Now Mr. Darwin does not say this, and his views often suffer from the zeal of those who believe themselves his followers, but have not his talent for accuracy in giving every statement about a case. What Mr. Darwin does say is that color is a "chief" guide, and this can scarcely be questioned. That it is some guide is certain. That it is not the only guide, he himself, with the remarkable candor so charac-

teristic of the man, shows in the same paragraph in which he reports his *Lobelia* experiment. Bees, he says, visited *Geranium phæum* after the petals had fallen, finding by experience that there was some nectar secreted by the apetalous flower. And he repeats that color is only an "approximate" guide. But, for all this, I think Mr. Darwin fails to give full credit to the bee's sagacity. To my mind much that has recently been written about the relation of insects to the color of flowers is but an illustration of the popular idea of "running a thing into the ground," and I think science is served when an exaggeration is—again in popular language—"sat down upon." I thought of this distorted view of Darwin's *Lobelia* experiment to-day while watching honey-bees at work on the flowers of the common snow-drop tree—*Halesia tetraptera*. We know now that there is scarcely a flower with the lower portion tubular, or which offers any obstacle, however slight, to the entrance of the humble-bee, that is not rifled of its sweets by being bored from the outside. Indeed, if bees were really intended to cross-fertilize flowers, the experience of Mr. Darwin with the European humble-bee would excite a smile in those with only an American experience, for indeed the American species are frauds of the first magnitude. They shirk their duty on the shallowest pretence. But though I have had suspicions, I have never been able to satisfy myself that the honey-bee does not perform its duties honestly. Whenever I have noticed it getting honey from the outside I have been unable to decide whether the hole was not there before and the honey-bee was not satisfying itself on the crumbs left from the stranger's table. On this occasion all the honey-gatherers were collecting from the outside, the pollen-gatherers only entered by the mouth. And I was satisfied, in all cases, that the holes had been made the day before by the humble-bee.

The corollas were now beginning to fall. The slightest jar of the tree sent numbers—literal snow-flakes—to the ground, and the bees were as busy as I ever saw them on the most favorite flowers collecting the nectar from the base of the now naked pistils. On branches where not a single corolla remained they were as active as if the perfect blossoms were still there. They had learned by experience that they could find what they wanted there. Though there was nothing but a slender pistil from a very inconspicuous base, the total absence of any bright color did not prevent them from alighting at the spot most convenient to them ; and it was evident that if the *Halesia* had never had a corolla at all, the bees would have been there all the same. Of course, color is an "approximate" guide to a bee as it is to us. In a basket of green apples that we had never seen before we should most likely try the most rosy-cheeked specimen first, only experience would teach us that a greening was as good as a Baldwin. It is so with bees. Accustomed to associate nectar with a blue *Lobelia*, and none with the faded flower, Mr. Darwin, if he had possessed as much faith as I have in the value of experience to a bee, would not have expected the creature to visit it after it had been led to believe the petals had fallen. If there had been honey in the calyx after the fading of the flower, as in the case of the *Halesia*, the bee would not have been so easily deceived ; and, as it was, I have

that faith in a bee's sagacity that I fancy if Mr. Darwin had continued the work for a few days, and on a scale to make it worth while, the little creatures would have found out the trick.

THOMAS MEEHAN.

Carex Pennsylvanica and Carex varia.—Whether these sedges are simply varieties, one of the other, or whether each is a true species, continues to be a mooted question. Without entering into the literature of the subject, it may be said that Gray, in the last edition of his manual, guardedly states that they "seem to run together."

The latest that I have seen touching the question is a note by Dr. E. C. Howe, in the BULLETIN for July, 1881, wherein is advanced evidence to show that the two plants intergrade. Dr. Howe states that in a large series of specimens "separation becomes guesswork." But does not the Doctor mean that certain characters presumed to be diagnostic of one or the other plant do not always so prove. As to the interchange, between these sedges, of characters which have been regarded as distinctive of one or the other, I fully agree with Dr. Howe; but from this I deduce, not identity of the two plants, but simply that certain differential characters are less stable than our text-books may have led us to believe.

Perhaps there is no surer way of discovering the true relationship of allied or doubtful species, whether of plants or animals, than by comparative study of their earlier stages of development. According to a now familiar biological law we expect community of origin of differing types of life to be indicated by increased similarity as we compare at successively earlier stages of development. Indeed, in recently differentiated forms, we would look for practical identity up to a point in development close upon maturity.

An application of these principles to the two *Carices* now under notice goes to show, not only that they are distinct species, but that their ancestral relationship was in some respects more remote than is their present; for certain differences between the plants are more emphasized in the earlier stages of their growth that at any later period. I refer particularly to differences in the leaves, scales and bracts and the disposition of the spikes. This fact is a significant one, and one on which the specific validity of the plants may safely rest.

But I wish chiefly to call attention to important differences in the subterranean parts of the plants which our text-books fail to recognize: *Carex Pennsylvanica* differs conspicuously from *Carex varia* in having running, underground stems. These extend in all directions from the central plant, each fostering a succession of shoots, some of which themselves become centres of a secondary series of runners, which thus distribute a numerous progeny all about their parent. I have unearthed runners bearing at intervals of a few inches four or more generations of living shoots, together with the remains of several older generations. Hence the new shoots do not always become established as separate plants, but often remain joined by underground connection, through the two or three years that they

appear to live. Where this sedge grows abundantly its runners are to be found crossing and recrossing beneath the surface, and careful excavation will show that many seemingly distinct plantlets belong to one system of underground stems. In some soils the plant grows more compactly than normally, and few runners are produced. In more favorable situations the runners are numerous, and many strike down diagonally into the earth, proceeding some inches before turning upward to the surface to bear a shoot.

The runners are at first clothed with closely imbricated scales or paleae arising from nodes all along the stem. These scales ultimately decay and become frayed into a coarse fringe, which remains appressed to the stem in whorls from every node.

In *Carex varia* we find a very different habit of growth. This species never produces running underground stems, and shows no disposition to spread, but grows in close tufts. Beneath the surface it develops a dense, knotty mass of small and closely aggregated rootstocks which bears a profusion of long fibrous roots. Year after year these rooty masses produce an abundance of new shoots, which rise from the surface amid the remains of the old. Each ultimate rootstock becomes the site for a cluster of compound shoots, and these secondary tufts, compacted together, make up the plant. A slight lateral prolongation of a shoot is sometimes necessitated by an obstruction in the most direct way to the surface, but this is the closest approach to subterranean spreading, and thus we find the plant forming neat, even-bordered tufts, there being no offshoots to mar the symmetry of outline.

In *C. Pennsylvanica* a slenderness of general habit is associated with a certain liberty of growth—a distribution of vital energy ; in *C. varia* similar vegetative conditions are contracted, and somewhat modified in action, resulting in greater solidity of growth and increase in the size of parts. We may say that in the principle of growth of one we perceive decentralization, enterprise, advance in many directions; of the other, centralization, conservatism, unified strength. In none other of our species of *Carex* of the section Montanæ do we find the counterpart of the running underground stems of *C. Pennsylvanica*. The closest approach to them is shown by *Carex umbellata*. From its dense, matted tufts, this sedge occasionally puts off short underground stems. These, however, are more like suckers than running stems, and never stray from the main tuft, but merely aid in increasing its dimensions. *Carex pubescens* is of less tufted habit than any of the other species of this section, the shoots being irregularly produced by a progressive underground stem or rootstock. But this bears no resemblance to the running stems of *C. Pennsylvanica*, being rather stout, with short, irregularly-branched divisions. Our only other species, *Carex Emmonsii*, is of very similar underground growth to *C. varia*, the difference, in fact, corresponding to the general difference between the superterrene parts of the two plants.

Riverdale, N. Y. City. EUGENE P. BICKNELL.

Survival of the Fittest.—When we use this expression it may be well to remember that accident has quite as much to do with fitness

as constitutional peculiarities. Where cattle are continually grazing, those tall growing plants which produce flowers only towards the ends of the branches extend amazingly if they happen to be distasteful to the animals. Plants of similar habit, if agreeable to cattle, cannot spread, because they are eaten off before they flower. Accidental introductions may thus be totally eradicated the first season, if annual—or confined to the original spot if a perennial plant. Thus, in Pennsylvania we have *Ranunculus bulbosus* and *Leucanthemum vulgare* common in our pastures because the cattle suffer them to go to seed. In vacant lots about our cities we have *Stramonium*, mayweed and many other plants progressing with amazing rapidity simply because not even the half-starved cattle of the "poor man" will pasture on them. But if an introduced plant can flower and fruit close to the earth, where some seed may mature though cattle eat the tops, it may survive and spread in spite of its being a good morsel for a hungry beast. Hence the *Lespedeza striata*, or Japan clover, has taken possession of immense territory in the South, because numerous seed-vessels mature close to the ground, between the crevices of rocks, or underneath loose stones, where cattle cannot get at them. If this were an erect instead of a prostrate plant, and did not flower till several inches high, it could not survive in a grazing country. There is no adaptation of the plant to the circumstances—the fitness is in the accident which came at the proper time to destroy or to save it.

In some gardens-weeds the accident is the early flowering. Chickweed, *Draba verna*, *Arabis Thaliana*, the shepherd's purse, and many other things are common in Pennsylvania gardens solely because they mature so very early in spring that seed is perfected before the gardener commences to use the hoe. When he begins this branch of cultivation the earth is full of seed for the next year's crop. If they flowered a month later than they do, they would soon be among rare plants, instead of being the common weeds they are. In a part of my grounds I have what I term my "botanical patch." There I sow every "weed" I can get from any part of the earth. Some escape, and I often enjoy noting how their peculiar characters fit them to spread without any modification of character to enable them to advance. Some four years ago, I had in this botanical border the pretty Siberian *Nonea rosea*. It matures its seeds sometimes in the early part of April with me. I am so situated that our serious attack on weeds seldom commences before the end of May. The *Nonea* has now spread and is not uncommon in many parts, and it is quite pleasant to note it struggling with, and successfully holding its own against, the *Thlaspi*, *Arabis* and other immigrants that have before ventured to regard the soil as their own. Having the broadest leaves and the rankest growth, it is of course more "fitted to survive" in its battle with the two named and similar others. But we may now bring in speculation and say "if" the *Arabis* should grow stronger—"if" the leaves should get broader—"if" the plant should flower earlier—"if" many other points which would be an advantage to the *Arabis* in the struggle should occur, these superior plants would produce a race which might in time crowd down the *Nonea*. Of course; but "if"

the *Nonea* grew also the stronger for its struggle, the battle would still be about equal, until an "if" in the shape of some such an accident as I have above illustrated should come in to the advantage of the victor.

It seems to me that there is another side to the subject of the "survival of the fittest" that we seldom have presented to our view.

THOMAS MEEHAN.

Note on Dicentra.—I find that in my garden the flowers of *Dicentra cucullaria* are systematically punctured by humble-bees; I have watched them in the process. Has this been noticed when the plants are growing wild? It sadly interferes with the very neat mechanism for cross-fertilization.

Providence, May 1, 1884. W. WHITMAN BAILEY.

Abnormal Hepaticas.—The blossoming of *Anemone Hepatica* in Ross Park, near this city, this spring, is very varied and profuse. Among the myriads of plants, I have noticed the following abnormalities:

(1) Dozens of plants have very deep blue sepals with a white or light blue margin. All of these are absolutely stamenless, though pollen was found upon the stigmas, whither it must have been brought by insects.

(2) Numbers of flowers were pure white, and all of these had nine sepals and bore—as far as the flowers were concerned—an exact resemblance to *A. nemorosa*. One *monosepalous* flower was found with six lobes, one of which was cleft to its centre, thus forming, with a stameniferous extra sepal, nearly an 8-sepaled specimen.

Binghampton, N. Y. C. F. MILLSPAUGH.

Tribute of Respect to Dr. Engelmann.—The following preamble and resolutions, indicative of the appreciation of the high scientific and personal character of the late Dr. George Engelmann, were unanimously adopted by the Botanical Section of the Academy of Natural Sciences of Philadelphia, April 14th, 1884,

WHEREAS, the Botanical Section of the Academy of Natural Sciences of Philadelphia has heard with profound regret of the death of Dr. George Engelmann; therefore

Resolved: We regard this as a calamity to Botanical Science and to those who were in any way associated with him in its study; also

Resolved: That in his life he furnished an example of industry in his profession, of devotion to science, of thoroughness in investigation, and of success in labor which will always command our admiration and respect; and be it further

Resolved: That by his readiness to aid all who were seekers after the truths of nature, by the conscientious answers to the botanical questions referred to him, no less than by his goodness as a man, we believe he has attached many to the science in whose service he died.

Resolved: That as a mark of respect to the memory of the deceased, these resolutions be entered upon the minutes of the Section, a copy be transmitted to his family, and also a copy of them

be furnished to the BULLETIN OF THE TORREY BOTANICAL CLUB and to the *Botanical Gazette*, with the request that they be published therein.

JOS. T. ROTHROCK.
THOMAS MEEHAN.
JOHN H. REDFIELD.

Botanical Notes.

Gender of Names of Varieties.—Among other subordinate questions in Natural-history nomenclature, it has been asked whether names of varieties, like those of species, should conform in gender to the genus, or whether they may not as well conform to the word *varietas* and so always be feminine.

Linnæus introduced the current practice of numbering varieties by the letters of the Greek alphabet, *α*, *β*, *γ*, etc. But to some varieties, evidently to the more important, he gave names. These names, when adjectives, were always (so far as we know) made to agree in gender with the generic name: ex. gr.—

Viburnum Opulus, *β roseum.*
Asparagus officinalis, *α maritimus*, *β altilis.*
Mesembryanthemum ringens, *α caninum*, *β felinum.*

In our days, named varieties play a more and more important part, and all botanists, as a rule, appear to have followed the Linnæan model, with now and then a divergence which is readily explained, and which may be said to be accidental, such as

Ripogonum album, var. *leptostachya*, Benth.

This is as one writes "forma *albiflora*" or "var. *albiflora*," a white-flowered form or variety. But that this is not the pattern or the true construction of varietal names appears at once on reference to ordinary cases. Thus, for example, in "*Nasturtium amphibium*, *α indivisum*, DC. Syst.," it is not an undivided variety of the species that is meant, but a name which stands in the same grammatical relation to *Nasturtium* that *amphibium* does, and to write *N. amphibium*, *α indivisa*, is obviously wrong. We should say that it makes no difference whether the word variety, or its abbreviation *var.* is expressed or understood. When the conditions of the case seem to call for it, we should write "*Nasturtium*, spec. *amphibium*," and just as L. C. Richard (a good model), in Michaux's Flora writes,

Viburnum dentatum, var. *α glabellum*, *β semitomentosum.*
Rhus Toxicodendron, var. *α vulgare*, *β quercifolium.*

The editor of the *Gardeners' Chronicle*(March 22, p. 373), having put this kind of question to Mr. Alphonse De Candolle (whom we should consider the highest living authority upon nomenclatural matters), understands him to reply that "the insertion of the abbreviation *var.* for *varietas*, which is feminine, demands a feminine termination; but if the word *var.* be omitted, then the rule would be for the variety to follow the specific name;" meaning probably the generic name, for in one of the examples given, "*Thymus Serpyllum*, *β montanus*," it does not follow the specific.

From this point of view, viz., that where the nature of the group (in this case, variety) is expressed the adjective name should be fem-

inine, but, where only understood, it might be masculine or neuter—we must commend the editor's closing remark:

"Perhaps the simplest and most easily recollected rule, would be to make the varietal name feminine in all cases, whether the *var.* or *varietas*, were expressed or understood. This at least would be intelligible, and would conduce to uniformity of practice."

It would also be logical, and the logic also would require all specific names to be feminine; for the word understood, *species*, is feminine.

Now we do not suppose that Mr. De Candolle would tolerate a double set of genders for the names of varieties. His doctrine is that the "var." should be discarded and the Greek letters only employed, not only for numbering the varieties, but for designating the fact that the name they are prefixed to is a variety.

It is not difficult to perceive why it has come to pass that "English writers generally use the abbreviation *var.*," and that some continental botanical writers follow the practice. One reason is that it enables us to cite an author's variety by its name without having to concern ourselves with its Greek number, whether it is β or γ or δ, which otherwise we should have to attend to. Another is that our sense of good form revolts at beginning sentences and paragraphs without capitals. In our books, varieties usually stand in independent paragraphs. Even in Latin we do not like to begin a paragraph:

"α *indivisum* foliis omnibus integerrimis serratisve, non aut vix basi auriculatis."

In English we can still less abide it. So we prefix "var.," and either number our varieties with Greek letters or, preferentially, leave them out.

But, we did not suppose that by the employment of the word "var." we had interfered with the relation of the name of the variety to that of its genus. Var. *indivisum*, in this case we should construe the phrase: "Varietas cujus nomen est *indivisum*. 'Var. *indivisum*' stands on the same ground as 'species *amphibium*.'" The latter rank we rarely need to express, because we always prefix the generic name or its initial. The former may often come in a shape which renders the designating prefix *var.* necessary, or at least most convenient.

We may, indeed, quite correctly write, *var. albiflora*, a white-flowered variety, *var. longfolia*, a long-leaved variety; but that is not according to the Linnæan pattern nor to the regular practice, nor to the strict analogy of the varietal name with the specific.

Moreover, if the gender of the word which designates the grade of the name is to govern the gender of the name, at least when expressed, as by *var.*, then all *subspecies* must be made feminine. Now this term *subspecies* is coming largely into use, and it has to be expressed in every case, in this wise:

Ranunculus aquatilis, L.
Subsp. *heterophyllus*.
Subsp. *hederaceus*, etc.

If the proposition which we deprecate is adopted these names would have to be written *heterophylla* and *hederaceea* by an author who ranked them as subspecies, but *heterophyllus* and *hederaceus* by one who took

them as varieties and simply numbered them by Greek letters. Obviously the propositions in the *Gardeners' Chronicle* had not been thoroughly worked out.—Asa Gray, in *Amer. Journ. Science.*

Sex in Plants.—Some interesting experiments have been carried out by F. Heyer (*Journ. Microsc. Soc.*, p. 251) with a view to determine the cause of differentiation of sex in unisexual plants. The result obtained in the case of diœcious plants, by experiments with 21,000 specimens of *Mercurialis annua* and 6,000 of *Cannabis Indica*, was that external conditions have no influence upon the production of seedlings of one or the other sex. In the case of the former plant the proportion of males to females produced was as 105.85 to 100, and in the latter as 86 to 100. In a second series of experiments made with monœcious plants, to determine whether external conditions of temperature and soil caused any difference in the proportion of male and female flowers, *Urtica urens*, *Atriplex*, *Spinacia*, *Xanthium*, and various Cucurbitaceæ produced negative results. He also came to the conclusion that sex is determined at an earlier period than the ripening of the seed. A knowledge of the means whereby female plants could be produced at will would be of considerable commercial importance, as, for instance, in the cultivation of nutmegs, hops, etc.

A gigantic Plane-tree.—Professor Virchow recently exhibited at a meeting of the Berlin Medical Society photographs of a gigantic plane-tree growing in the Island of Cos, under the shade of which Hippocrates is said, by tradition, to have held medical consultations. The tree now stands in the market-place of Cos on the east side of the island. The branches, which spread over nearly the whole of the market-place, are supported by marble pillars.

Botanical Literature.

A Catalogue of the Native and Naturalized Plants of the city of Buffalo and its vicinity. By David F. Day. 8vo, pp. 215. Buffalo: Baker, Jones & Co. 1883.

Of purely local floras, this, presenting the names of all the plants which have been detected within a radius of fifty miles of Buffalo, may be regarded as one of the completest that has ever been published in this country. All the classes in the vegetable kingdom are included, and the number of plants enumerated, according to the tabular statement on page 190, is 2,739, which are distributed among 946 genera.

Mahonia Aquifolia as a Nurse of the Wheat Mildew (Puccinia Graminis). By C. B. Plowright. (From *Proceedings* of Royal Society, No. 228).

On the Life History of the Dock Æcidium (Æc. Rumicis). By C. B. Plowright. (From *Proceedings* of Royal Society, No. 228).

The Microscopical Bulletin and Opticians Circular.

Under this title, the well-known opticians, Messrs. James W. Queen & Co., of Philadelphia, have recently begun the publication of a bi-monthly which will prove of value and interest to all microscopists, and which will no doubt be well supported by them. Sample copies will be sent to those who request them.

The Microscopic Examination of Timber with regard to its Strength. By F. M. Day.
(From the *Proceedings* of the Amer. Philosoph. Society.)

On the Comparative Morphology of Sciadopitys. By M. T. Masters, M.D.
(Reprint from the *Journal of Botany*).

Proceedings of the Torrey Club.—At the regular meeting of the Club held Tuesday evening, April 8th, the President occupied the chair and eighteen persons were present.

After some remarks by the President on the efforts that are being made to save the Adirondack forest, a committee, consisting of the President, Vice-President and Secretary, was appointed to draft resolutions to be presented at the public meeting to be held at Chickering Hall.

Mr. Hollick read a paper entitled "Notes on the Genus *Viola*," of which the following is an abstract:

The Genus Viola:—The changes which most species of the genus *Viola* undergo in the late summer and autumn months do not seem to have had the attention bestowed upon them that their importance deserves. The changes are in leaf, stem and flower, and are apparently invariable and constant, hence of considearble value in determining specific differences.

The following species were collected and studied during the past year: *V. cucullata*, Ait.; *V. sagittata*, Ait.; *V. palmata*, L.; *V. blanda*, Willd; *V. primulæfolia*, L; *V. lanceolata*, L; *V. odorata*, L.; *V. pedata*, L. and *V. canina*, L., var. *sylvestris*, Regel.—*V. cucullata* and *V. sagittata* are connected by every conceivable intermediate form, and *V. palmata* also connects with the former by insensible gradations. There is one characteristic, however, which can always be depended upon to distinguish *V. cucullata* and its varieties from the other species, and that is the decumbent habit of the cleistogamous flowers. Indeed, the entire growth of this species partakes of the decumbent habit, the rootstock, leaves and flowers being seldom if ever strictly erect. In *V. sagittata* the growth of the plant is erect from the roots and continues so throughout, and the cleistogamous flowers are conspicuously so.

It is sometimes difficult to know, from superficial appearances, where to place *V. palmata*, whether as a variety of *cucullata* or *sagittata*, but the decumbent habit of the intermediate forms point to the former as the the type. In the young plants of *palmata*, the palmate and cucullate leaves may often be seen on the same plant, this being in accordance with the well recognized principle that the typical form is always more manifest in the young individuals of the variety or derived species.

The three species of white violets are known to be very closely allied. *V. primulæfolia* and *V. lanceolata* produce such a variety of intermediate forms that it is an utter impossibility to say definitely where some of them belong. *V. blanda*, however, is unmistakably distinct, in several particulars. In the autumn, all three of these species produce runners, but no detailed description of the latter seems to have been made. In the entire Torrey herbarium

there is but one specimen representing the autumn transformation! In *V. blanda* these runners are almost roots, being more or less under the surface of the ground, slender, producing no leaves and bearing no cleistogamous flowers. They grow from the main rootstock, are not numerous, and are somewhat decumbent. *V. primulæfolia* has runners that sometimes reach a length of 12 inches. They are comparatively stout, run along the surface of the ground, and are mostly leaf- and flower-bearing throughout. These runners have nodes or joints from each of which the leaves and erect cleistogamous flowers start—usually one of each. They root at these nodes, and, during the month of October, break away from the parent plant, the nodes forming the nuclei of new plants for the next year. In nearly every specimen the cleistogamous flowers far outnumber the others. The typical form of *V. lanceolata* has somewhat shorter and more robust runners, which are also more leafy—sometimes appearing almost like incipient branches. While the latter two species are invariably found in company, the former is more often solitary, which is another point in its claim for specific distinction.

In all three species the runners begin to form about the middle of August, reach their full growth about the beginning of October, and then most of them decay except at the points where they have taken root.

Viola odorata produces both runners and cleistogamous flowers. The flowers are quite numerous, starting from and clustering around the main rootstock. They are very much appressed, sometimes appearing as if subterranean. The runners, although having leaves, do not seem to bear cleistogamous flowers.

Viola canina, var. *sylvestris*, shows a very beautiful transformation. The branches of the season become elongated, sometimes to full seven inches, and bear clusters of cleistogamous flowers, each upon a short, slender peduncle in the axils. In some specimens little branchlets start from the axils, bearing both leaves and flowers. The autumnal peduncles are not more than two inches long, while those of the early spring are generally three or four inches in length. Again, in the spring, there is but one flower from each axil, while in the autumn there are two or more.

Viola pedata apparently does not produce cleistogamous flowers, but it very commonly blossoms a second time in the autumn. Specimens have been collected as late as the middle of November.

Mr. Schrenk supplemented the paper with some notes on the structure of cleistogamous flowers.

Mr. Britton referred to a peculiar form of *Viola blanda* (*V. amœna*, Leconte) with petioles and peduncles flecked with red.

Veronica Buxbaumii, Tenore, is reported by Mr. Britton as becoming a weed in many places. It is very common in gardens at New Dorp, S. I., and specimens have just been received from New Brunswick, N. J.

BULLETIN

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New Species of Grasses.

By Geo. Vasey.

Panicum Chapmani.—Culms tufted, 1 to 3 feet high, erect, slender, smooth, mostly simple; leaves chiefly radical, often 1 foot or more in length, 1 to 2 lines wide, firm, often involute when dry, the sheaths narrow, shorter than the internodes of the culm, smooth, finely striate, sparingly ciliate on the margins; ligule a short ciliate ring; blade 6 to 12 inches long, attenuate-pointed, scabrous above, slightly ciliate below. Panicle 6 to 12 inches long, narrow, racemose, composed of 8 to 10 sessile spikes, which are approximate toward the apex, gradually becoming 1 to 2 inches distant, appressed, the upper ones about one-half inch long, the lower ones 1 inch or more, containing from 3 to 12 spikelets; the rhachis flexuous, triquetrous, scabrous, and terminated by a short bristle; there are frequently 1 to 3 secondary racemes from lateral peduncles, which are sometimes nearly as long as the terminal one. Spikelets 1 line long, first glume broad, obtuse, one-quarter or one-third as long as the spikelet, second glume 7-nerved, as long as the flower, third glume 5-nerved, slightly exceeding the flower; flowering-glume ovate, acutish, finely striate; palet of equal length with its glume.

This is the *Panicum tenuiculmum* of Chapman's Flora, but is not the *P. tenuiculmum* of Meyer, and I am unable to find it described. It is dedicated to the esteemed author of the Flora of the Southern States.

Panicum Hallii.—Culms cæspitose, 1 to 2 feet high, erect, smooth, simple or sparingly branched, each with about 4 light green, striate leaves, which are 3 to 6 inches long, and 2 to 3 lines wide; ligule a ciliate ring; sheaths smooth or somewhat pubescent. Panicle 4 to 6 inches long, the branches erect spreading, mostly single, alternate and few flowered, the lower one 3 or 4 inches long and subdivided, naked below; the rhachis smoothish, pedicels about as long as the spikelets. Spikelets about one and one-half lines long, acute or acutish, very smooth, first glume broadly ovate, acutish, half as long as the spikelet, second glume ovate lanceolate, acute, 9-nerved, one-quarter to one-third longer than the fertile flower, third glume (that of the sterile flower) 7- to 9-nerved, acute, equal to the second, and enclosing a palet half as long; flowering-glume a line long, oblong, obtuse, smooth and shining.

This is number 816 of E. Hall's Texas collection, distributed as *P. giganteum*, Scheele. It has since frequently been collected in Texas and New Mexico. The spikelets resemble those of *P. virgatum*.

The panicle resembles that of *P. proliferum*, but is a distinct and good species, to which I give the name of its earliest collector, the late Mr. E. Hall.

The May Apple (*Podophyllum*) presents several peculiarities in its development which are so interesting as to merit an explanation. The non-flowering-stem of this plant bears but one leaf, while the flowering-stem bears two leaves, the flower being between them. A section of the base of the flowering-stem reveals nothing peculiar, it is merely a continuation of the rootstock (Fig. 1). The section of the base of the non-flowering-stem, however, reveals a bud, which represents the continuation of the root-stock (Fig. 2). A careful examination shows a small slit at one side of the bud by means of which it has access to the air (Fig. 4) and a cross-section shows that

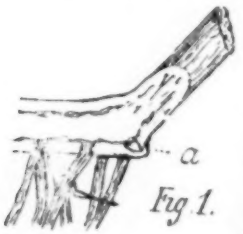


Fig. 1.

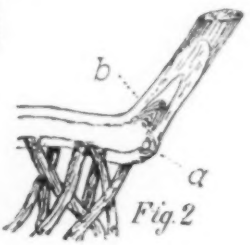


Fig. 2

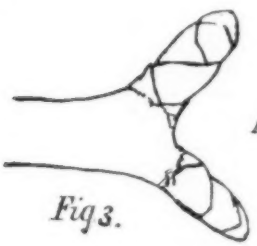


Fig 3.

Fig. 4

it is formed by the overlapping of the two edges of the stem about the bud (Fig. 5). In a logitudinal section I find the bud-cavity to be placed quite near to the margin of the stem (Fig. 6). Upon examining the older nodes of the rootstock I find undeveloped buds (Fig. 7.) which are placed quite near to the margin of a scar which is pitted like a leaf-scar. In fact, the non-flowering-stem of the May-apple is only a leaf, the base of whose petiole encloses a bud. When two such leaves arise, as is not unfrequent, the bud is enclosed by the base of the inner, second leaf. As a rule, the life of *Podophyllum peltatum* is prolonged by the development of axillary buds into branches (Figs. 1, 2, 7, 8, *a*), because the terminal flowering-stem perishes and the terminal buds of non-flowering stems rarely develop (Fig. 7, *b*). In one abnormal specimen found, a lateral bud divided at its tips, neither branch being axillary to the other (Fig. 3). And here I would state what appears to me a remarkable fact: while the

axillary branches always produce long internodes, the terminal bud of a non-flowering stem, whenever it develops, produces only extremely short ones, so as to be practically almost none (Fig. 8). This is a case never found by me in any other plant.

The flowers of the May-apple are terminal. The flower-stems

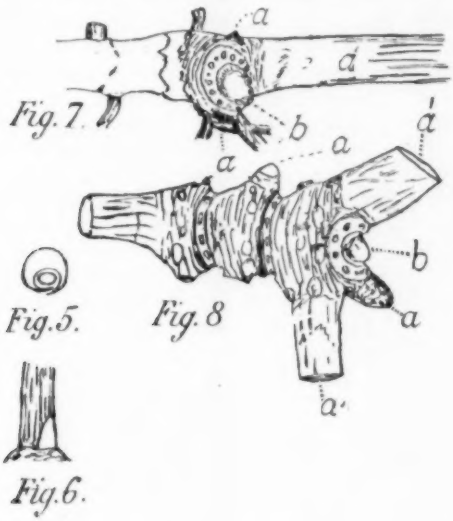


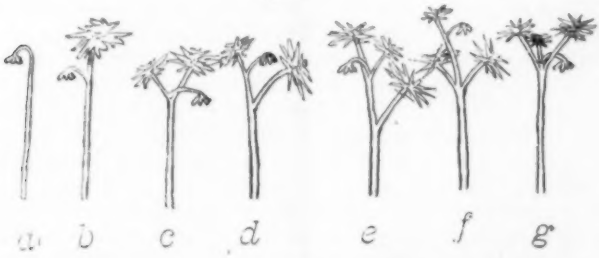
Fig. 7. *Fig. 8*

Fig. 5.

Fig. 6.

may be entirely destitute of leaves, as was a specimen found by me last spring, and which I sent to Prof. A. Gray at the time of discovery (Fig. 9). During one hour this spring I collected within the same woods six specimens of *b*, innumerable quantities of *c*, the usual form, sixteen of *d*, six of *e*, three of *f*, and one of *g*, a form in which

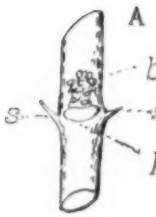
Fig. 9.



three leaves and the peduncle originated from the same point of the stem. In each case the peduncle of the flower bent away from the petiole of the last leaf; a fact which is explained by considering the leaves of the ordinary bifoliate type as not being truly opposite, but merely apparently so, from the close proximity of the one to the other. The leaves are alternate, and the peduncle bends from the

petiole which properly belongs to it. The latter is always the smallest petiole of any developed on the plant.

The prickles of the Robinia have been explained as stipules, but never, so far as I remember, have those of *Xanthoxylum Americanum*. There are two prickles, one on either side of the petiole-scar, and, as a general thing, somewhat above the latter. Occasionally the thorns are scarcely developed, so that they can be traced only by the fibres belonging to them in the bark. These fibres, whether belonging to a developed or to a latent prickle, always run *into the wood*, showing them to be not a mere product of the bark; and their situation would define them as stipules. Prickles or thorns therefore may represent four different parts of a plant—the stem or a branch, the leaf or its ribs, mere emergences of the bark, and stipules. In Fig. A, *p* is a node, *b* is a branch, and *s s* are stipular prickles. Fig. B represents the bark removed to show the entrance to the vascular fibres into the wood.



DESCRIPTION OF FIGURES.—Fig. 1. Flowering stem. Fig. 2. Non-flowering stem. Fig. 3. Abnormally divided root-stock Fig. 4. Leaf sheathing at *c*. Fig. 5. Section of sheathing base, "*c*." Fig. 6. Vertical section. Fig. 7. The bud (*b*.) formerly sheathed by a leaf. Fig. 8. The sheathed bud developing for several years. *a*. Axillary bud. *a'*. Developed axillary bud or branch. *b*. Terminal bud.

Dayton, Ohio. AUG. F. FOERSTE.

Æcidium Bellidis.—In a note upon this fungus in the BULLETIN for March, 1884, p. 32., I stated that I had produced it from the teleutospores of *Puccinia obscura*. This *Puccinia*, however, occurs in the United States, specimens of it having been sent to me by Professor Farlow, who also informs me that the host-plant of the *Æcidium* is neither indigenous nor cultivated in gardens, except very rarely. It has been assumed by many persons, notably by some of those who write books upon botany, that the æcidial stage is absolutely necessary to the perpetuation of those species of uredines which possess it. This, however, is by no means true. Witness not only the presence, but profusion of the wheat-mildew (*Puccinia graminis*) in districts where the barberry is very scarce, as in the fen country of Norfolk and Lincolnshire in England. The same is even more strikingly shown by the ravages of this fungus upon the wheat crops in Australia, where none of the barberries is indigenous. Impressed by these facts, I have given this matter some special attention, for, living as I do upon the borders of the fen district it has been constantly brought under my notice. It has been thought that a single barberry bush could produce æcidiospores enough to infect half a county, all that was necessary being a few stiff breezes to waft the spores from the bush to the corn, miles away, in the same manner in which we have been taught to believe the spores of *Peronospora infestans* were blown from one end of Europe to the other

in the year 1845. Any one, however, who has practically studied the life history of the uredines must be aware that all æcidiospores (like the conidia of the *Peronosporæ*) are endowed with but a very limited term of vitality. If we wish to infect a plant with the æcidiospores of a uredine they must be perfectly fresh, as well as perfectly ripe, and to imagine that the spores of *Æcidium Berberidis* can be blown mile after mile by the wind and still retain their germinative power is simply absurd. If we observe what actually occurs in nature we shall have ample evidence that this far spreading of the parasite does not take place in the aforesaid manner. It is not in the district from which I write an easy thing to find a barberry bush in the hedge of a corn-field, for the practical nature of the observations made by our agricultural forefathers have pretty well exterminated the barberry. I was, however, able to do this two years ago. Three barberries grew in the hedge of a wheat-field, and around each of these bushes the wheat at harvest was as black as if soot had been scattered upon it, in a semicircle about 50 yards across. Nearest the bush it was quite black, but the mildew gradually became less and less the farther we proceeded from the bush. The rest of the field was perfectly healthy.

When the parasitic fungus starts from the æcidiospore, the teleutospores are produced very early, and in great profusion, but when it starts from the teleutospore the uredo is in great profusion and the teleutospore comparatively sparse. I obtained some specimens of wheat mildew from Australia in which the enormous development of "rust," compared to the "mildew," was very striking and unlike anything I had ever previously seen in England. It was this which first drew my attention to the above-mentioned fact, to which I alluded in a paper on the subject of Heteroecism, in "Sunlight." It is also observable in *Puccinia rubigo-vera*, which is here very abundant early in the year upon wheat. The uredo is extremely abundant, but the teleutospores are but slightly developed. The æcidium of this *Puccinia* I have never yet seen in the fresh state, although the other spore-forms are to be found in every wheat-field. The same is true of the specimen of *Puccinia obscura* which Professor Farlow sent to me, as compared with the fungus as it occurs when developed directly from the daisy æcidium. I am much pleased to find that Mr. Rostrup the eminent Danish mycologist, in his recent paper, Heteroeciske Uredineer, holds the same view. He mentions the fact that *Coleosporium Senecionis*, when growing in districts in which fir-trees do not occur, consists almost entirely of uredospores. Further, he has found *Chrysomyxa Ledi* upon a plant of *Ledum palustre* from Greenland, a country in which the æcidium-bearing host-plant (*Picea excelsa*) does not grow.

King's Lynn, Eng. CHARLES B. PLOWRIGHT.

Mutilation of Flowers by Bees.—Referring to Prof. Bailey's note in the May BULLETIN, I may say that it has been a matter of frequent observation with myself that the flowers of *Dicentra Cucullaria* are systematically punctured by bees; when growing wild *Corydalis glauca* suffers in the same manner, and, I doubt not, other members of

the family also. As Mr. Meehan remarks in the same number of the BULLETIN, this lawless trait of the humble-bee may be easily observed. It is an acquired habit, and one that has not yet reached its fullest development, for, while some species of flowers are invariably punctured, others, which are even more difficult of access, are approached in the legitimate manner and are never mutilated. In some localities, hardly an individual of *Gerardia integrifolia* will escape being punctured, and always, so far as I have observed, in the same relative portion of the corolla. In both cases, too, the corolla is bored before its lobes have been unfolded; yet not all the bees seem to understand this, for while by far the greatest numbers fly at once to the puncture made by some previous visitor, others will visit every flower in the regular manner, showing that some understand the operation while others do not. Again, although the *Gerardia* is commonly punctured, it has a comparatively open and accessible corolla, and, on the other hand, the corolla of *Linaria vulgaris*, which is thoroughly closed, is, I believe, never punctured, though the bees visit it in numbers and are forced to no slight exertion to reach its interior.

To me the interpretation of these facts is that while there is the appearance of a purpose in the act, yet it is in the main a blind operation on the part of the bees, and, in any event, they fail to derive the greatest possible benefit from their work, when they persist in boring an open corolla and approach a closed one in the laborious manner which its peculiar mechanism demands.

Mountainville, N. Y. WINTHROP E. STONE.

Dicentra Punctured by Humble-Bees.—In the last number of the BULLETIN, (p. 55) Prof. W. Whitman Bailey, of Rhode Island, says: "I find that in my garden the flowers of *Dicentra Cucullaria* are systematically punctured by humble-bees; I have watched them in the process. Has this been noticed when the plants are growing wild? It sadly interferes with the very neat mechanism for cross-fertilization."

Several years ago Dr. A. K. Fisher called my attention to the fact that humble-bees were in the habit of obtaining honey from this species by biting through the base of the corolla; and I have since observed that, along the borders of the Adirondack region, in Northeastern New York, it is the exception to find a mature flower of either *Dicentra Cucullaria* or *D. Canadensis* that has not been thus punctured. Whatever be its theoretical bearings upon the fertilization of these plants, the fact remains that both species still thrive here, growing abundantly and in luxuriance.

Locust Grove, New York. C. HART MERRIAM.

Dicentra Punctured by Humble-Bees.—In reading Prof. Bailey's note in the May BULLETIN on the perforation of the flowers of *Dicentra Cucullaria* by humble-bees, I am reminded that the late Mr. Leggett once noted a similar circumstance in plants sent to him from Lewis Co., N. Y. For the benefit of those who are not fortunate enough to possess a complete set of the BULLETIN, I make the following extract from Mr. Leggett's note:* "C. went to the woods

* Extract from a letter sent to Mr. L. from Lewis Co., BULLETIN, iii., 33.

and spent several hours watching the bees. The woods were full of Dicentras this spring. He could not find a spike of any species on which there were not one or more punctured flowers. He saw several humble-bees performing this labor, and many honey-bees sucking the honey, but in no instance did he see the honey-bee make the incision." N. L. BRITTON.

Teratology.—A head of the ox-eye daisy (*Chrysanthemum leucanthemum*, L.) has just been brought to me by a lady (Mrs. Cowles) living in Hamden which has the rays replaced by white tubular corollas one-quarter of an inch long, gradually ampliated outwards, and irregularly 5-lobed. Most of these corollas are somewhat bilabiate, with three parts in the lower lip, and two, a little smaller, in the upper. The veins of the lobes are submarginal and unite below the sinuses, as in the normal disc-flowers of the order. These ray-flowers have both stamens and a short, included style, like that of the disc-flowers. The ray-flowers are in general structure comparable to those of *Chænactis*, but there are no gradations from them to the disc-flowers in this specimen. Is this condition to be explained by a simple reversion of the usual rays to a form more like that of the disc-flowers, or by supposing the ray-flowers to be deficient, and the exterior disc-flowers to be enlarged so as to replace the rays? One of these exterior flowers, which I dissected, had the ovule well developed, and it is probable that all would have been fertile.

Mrs. Cowles tells me that the plant bore six heads like the one sent to me.

New Haven, June, 1884. DANIEL C. EATON.

Another Florida Fern has been lately discovered by Miss Mary C. Reynolds, viz., *Phegopteris tetragona*, Mett. This is one of the species which has sometimes the faintest rudiment of an indusium, and so has been referred to *Aspidium* in Mettenius's later writings. It has a creeping rhizoma, and rather thin herbaceous and finely pubescent fronds one or two feet high. These are pinnate with a gradually decreasing apex and several pairs of long and not very deeply pinnatifid pinnæ. The veins are simple, and the 2–3 basal ones are connivent as in *Aspidium molle*. It is common in the West Indies, and on the continent from Panama to Brazil. Miss Reynolds "found it a year ago in a live-oak hummock in Marion County, well established there, and a very pretty fern it is, too." "When growing, there is a metallic lustre about it that to me is very pleasing."

New Haven, June, 1884. DANIEL C. EATON.

Albinism.—During the winter and spring I have found, usually single plants only, sometimes several clusters, of the following species with pure white blossoms. The whole plant was of a lighter green than usual, no other color being present: *Delphinium decorum*, F.&M. (one specimen); *Sidalcea humilis*, Gray (two specimens); *Erythræa venusta*, Gray (several clusters); *Gilia dianthoides*, Endl. (common in places); *Linaria Canadensis*, Dum. (one case); *Orthocarpus purpurascens*, Benth. (often nearly white); *Mirabilis Californica*, Gray

(not rare); *Brodiæa capitata*, Benth. (three specimens). *Phacelia Parryi* and *P. grandiflora* are found nearly white occasionally, very rarely pure white.

A bud on a branch of *Mimulus glutinosus*, v. *puniceus*, upon developing in a vase, was identical in color with the typical form of *M. glutinosus*, Wendl.

San Diego, Cal. CHARLES R. ORCUTT.

Absorption in partially severed Branches.—In the recent experiments reported by Francis Darwin (*Nature*, Vol. xxx., p. 9) upon the absorption of water by plants, he alludes with surprise to the fact that "cuts to the depth of half or more than half the diameter of the branch produce practically no diminution in the rate of absorption."

Remarkable instances of a similar, if not identical, phenomenon often come to the notice of the arboriculturist, and the following illustration of the ability of a greatly reduced cellular area to supply moisture, etc., occurred in our garden last year. A large apple-tree, with a spread of branches almost circular, twenty feet in diameter, with four main limbs, twenty-five secondary limbs, and a numerous growth of twigs and final ramifications on the outskirts and summit of the tree, had suffered from being too deeply covered with earth around the trunk, and the epidermal layers sickened and died, contracting the available area by which sap passed to and fro in the general circulation of the tree to a strip of bark less than two inches in width. The trunk at this point was three feet in circumference, and above the zone of dead tissue, which was removed, the bark retained its healthy and normal condition.

The tree put out leaves in great abundance, and blossomed luxuriantly. The disproportion between the area supplied with nutriment from the roots, and the size of the bark connective, seems very remarkable, and may be considered analogous to the conditions in Dr. Darwin's experiment, where the rate of transmission of moisture was unchanged in a half-severed twig. As the season advanced and became drier and hotter, the tree became sickly. It was deprived of the use of a large portion of its roots and could not, with the limited resources furnished it, feed itself with sufficient moisture; but the capacity of a very restricted line of cells to sustain, at least temporarily and under favorable conditions, a perfect union between the body of the tree and its roots was demonstrated.

L. P. GRATACAP.

Botanical Notes.

Palms.—Some interesting details respecting these princes of the vegetable kingdom, as Linnæus called them, are to be found in Sir Joseph Hooker's last report on the progress and condition of the Royal gardens at Kew. The extent to which they have recently been brought into cultivation is noteworthy.

Miller in his Gardener's Dictionary, edition of 1731, knew of seven species; but only two were generally known in conservatories, the dwarf fan-palm of the south of Europe, and the date. Aiton's

Hortus Kewensis, in the second edition (1813), enumerates only 24 species. The Loddiges, great cultivators of palms, who possessed in their day much the largest collection known, enumerate 210 species in their nursery catalogue of the year 1825. In the Herrenhausen conservatories, Hannover, Wendland had assembled 287 species in 1835, and 445 in 1882. This is the largest collection in the world; but the noblest must be that of the Botanical Gardens of Buitenzorg, Java, which, in 1860, boasted of 273 species, "all standing naked in the open air."

It is only when the literature of the order is brought together systematically, that we appreciate the extent and variety of palms. In the new Genera Plantarum, Sir Joseph Hooker characterizes 132 genera of true palms, and indicates about 1,100 species.

Our readers may like to know what palms are indigeneous to the United States, and what names they now bear. Without counting one or two tropical species which grow in Southern Florida, and which are outlying Cuban and Bahaman species, we have two true palmettos, *Sabal palmetto*, and *S. Adansoni*; the blue palmetto, *Rhapidophyllum hystrix* of Wendland; the saw palmetto, *Serenoa serrulata* of Hooker. This is the old *Sabal serrulata*, upon which Hooker has recently founded a new genus, dedicating it to our associate, Sereno Watson (*Palmam qui meruit ferat*) there being already a *Watsonia* in honor of an earlier botanist of this name. Finally we have, just beyond our national borders, namely on the Islands of Lower California, a palm of a peculiar genus, instituted by Mr. Sereno Watson, the *Erythea edulis;* and in Southern California the elegant *Washingtonia filifera*, with which Wendland has complimented our country by naming this palm in honor of its first president. The only other president so distinguished is Jefferson. *Jeffersonia diphylla* is one of our choicest spring flowers.—*Science.*

Morphology of the Husk of Carya.—At a recent meeting of the Philadelphia Academy of Natural Sciences Mr. Meehan exibited some nuts of *Carya glabra*, Torr., which had been brought in by one of his seed-collectors from a tree in the woods in the vicinity of Philadelphia. They had two, or sometimes three, nuts in a single exocarp, as in the manner of *Castanea vesca*, the common chestnut. The collector was under the impression that all the nuts borne by the tree were of a similar character.

Dr. Asa Gray, who was present, remarked that this occurrence of two or three nuts of *Carya* within the same husk, either separate or partly coherent, was of much morphological significance. Specimens like these, said to have been collected in Montgomery County, Penn., had been sent to him several years ago, with the remark that the tree bore a good many such abnormal fruits; Dr Gray believed that the conclusion to which they inevitably pointed had not yet been published. It was, however, communicated to Dr. Engelmann, along with a portion of his specimens, at least five years ago. The conclusion drawn was the following: The husk, or so called exocarp, of *Carya*, is an *involucre*, usually containing a single female flower, and connate with its ovary; its true morphology is revealed when, as in this case, it contains two or three flowers. The stone or shell of the

nut is the whole pericarp in *Carya* as much as in *Corylus*. In the former genus it becomes free from the four-valved involucre at maturity; in *Juglans* the congenital union is more permanent, forming a drupaceous accessory fruit, of which the fleshy part is involucre, the bony part is pericarp. This view directly homologizes the Juglandaceæ with the Cupuliferæ.

Tamarinds.—There are few people to whom the flavor of preserved tamarinds is not agreeable, but do those who frequently use tamarinds know how they are prepared? They come into commerce both from the East and West Indies; the latter, it would seem, are simply the fruits, or, rather, pods from which the shell or epicarp has been removed, and the pulp together with the strong fibrous framework upon which it is built, and the seeds are placed in alternate layers with powdered sugar in a cask or jar, over which boiling sirup is afterward poured. In the East Indies it seems they are prepared by first removing the epicarp and seeds by hand, after which the pulpy portion is usually mixed with about 10 per cent. of salt, and trodden into a mass with the naked feet. Of these tamarinds several qualities are known in the market, the best being free from fibre and husk, and the worst containing both, together with the hard stone-like seeds, which are commonly eaten in the East Indies after being roasted and soaked to remove the outer skin, and then boiled or fried, when they are said to be tolerably palatable. West Indian tamarinds are alone officinal in the British *Pharmacopœia;* while on the Continent those from the East are alone employed. Besides the tamarinds sent to Europe they are also shipped in large quantities from Bombay to Persia and other northern countries.—*Gardeners' Chronicle.*

Attraction of Insects by Phallus and Coprinus.—E. Ráthay and B. Haas have examined the structure of the fructification of *Phallus impudicus*, with a view to determine the peculiarities in its construction which attracts flies and other insects to it. This is effected partly by the odor and partly by the taste. They find the fluid which results from the deliquescence of the gleba to contain an abundance of sugar; and they observed visiting this as many as fourteen species of insects, most of which also visit the nectar of flowers or feed upon honey-dew. The same phenomenon is exhibited by a number of other species of Phalloideæ; and the explanation suggested is that the insects are useful to the fungi in disseminating the spores which are set free by the deliquescence of the gleba [Cf. BULLETIN, Vol. vii., p. 30, where this same view is put forth by the Editor.]

The pileus of species of *Coprinus* and of some other species of Agaricini also exude sugar.

With regard to the exact chemical nature of the substance formed, the authors state that it consists in all these cases, in addition to dextrose, of another sugar which belongs to the same class and is probably trehalose. In *Phallus impudicus* there are no less than three substances which reduce alkaline solution of copper, viz., dextrose, torulose, and a substance intermediate between dextrose and gum. In *Coprinus deliquescens* the only one of these substances present is dextrose.

The Parasites of Money.—The *Frankfurter Zeitung* states that Dr. Reinsch has found, as the result of a long series of minute investigations, that the surfaces of 50-pfennig pieces which have been long in circulation are the home and feeding-ground of a minute kind of bacteria and vegetable fungus. An extended series of observations showed that this is the case with the small coins of all nations, the thin incrustation of organic matter deposited upon their surfaces in the course of long circulation rendering them very suitable for this parasitical settlement. Dr. Reinsch scraped off some of these incrustations, and with a small scapel divided them into fragments, which were subsequently dissolved in distilled water. The employment of lenses of very high power showed the bacteria and fungi distinctly.

The Banyan tree.—Respecting this tree, Forbes, in his "Oriental Memoirs," says that a Banyan tree, named Cubbeer Burr, was nearly 2,000 feet in circumference, measured round its principal stems, but that the ground covered by its overhanging branches was considerably more extensive. The large trunks numbered 350, and the smaller ones exceeded 3,000. This tree at one time was considerably larger, a fearful storm, accompanied by a flood on the Nerbudda, having carried away a greater part of it, reducing the number of the larger trunks from 1,350 to the 350 now remaining. The original size of this colossal tree may be better conceived by remembering that 2,000 feet, its circumference when Forbes saw it, is more than one-third of a mile. It is truly one of the wonders of Nature. The careful provision by which everything is made to adapt itself to the circumstances in which it is placed is strongly exemplified in the growth of this tree; for if these branches did not throw out roots, and so form a trunk with which to support their own weight, they would tear themselves off from the parent stem.—*The Garden.*

Absorption of water by plants.—Mr. F. Darwin, in an article on this subject recently published in *Nature*, shows that the rate of absorption is influenced by the dampness or dryness of the air, being more rapid in dry air, owing to the more rapid evaporation from the leaves, and more rapid in sunlight than in shade. He also confirms Baranetzky's statement that a small disturbance, such as a slight shake, by increasing the transpiration from the leaves, increases the rate of absorption, while cutting off a twig rapidly diminishes it. A. Sorauer, however, found in some experiments on gourds that the removal of leaves from plants on two occasions did not alter the amount of evaporation in the least; and even when half the leaves were removed from another plant, although a reduction in the amount of evaporation ensued at first, after eleven days the evaporation was equal to that of an untouched plant.

The American Association for the Advancement of Science.—The committee of the American Botanical Club of the A. A. A. S. has so far arranged the programme for the next meeting in Philadelphia, opening September 4th, that they are enabled to assure the botanists of the country a most enjoyable and profitable time. All botanical members of the Association should call at the Academy of Natural Sciences as early as possible after arrival and register. They will find a committee in charge to welcome them to the privileges of the

Club and of the Academy, and to assist them in becoming acquainted with other botanists.

Excursions in addition to those of the general Association have been arranged to the pine barrens and to the Bartram gardens, and others will be added. Upon Monday evening, September 8th, the Botanical Section of the Academy of Natural Sciences will give a reception to the Club at the rooms of the Academy. The hours for meeting of the Club will be annouced daily during the session.—J. C. ARTHUR, Chairman of Committee.

Botanical Literature.

A Manual of the Mosses of North America. By Leo Lesquereux and Thomas P. James. With Six Plates illustrating the Genera. 8vo, pp. 447. Boston: S. E. Cassino & Co. 1884.

In this volume we have a manual which will be greeted by all botanists as a valuable addition to the literature of the subject, supplying a need that has long been felt. To the arduous and protracted labors of the authors, with the assistance of other eminent bryologists, both in this country and abroad, the students of this delightful branch are indebted for a most satisfactory guide. It contains 447 pages, with descriptions of nearly 900 species, includes a good glossary and is illustrated with six plates. The type is clear, and the descriptions are full and amended from the most recent investigations —corrections and additions having been made just before going to press. We notice with pleasure copious descriptions of the orders and tribes, with bibliographical references and systematic tables. The classification is that used in "Sullivant's Mosses" (Gray's Manual, 1863), with additions; the class being sub-divided into three orders, Sphagnaceæ, Andreæaceæ and Bryaceæ; the first two including one genus each, the last, 23 tribes and 126 genera. One oversight has been noticed on page 5 which contradicts the text on page 95. *Eustichia* is given under the sub-division of "Teeth of the peristome 16," and, below, "fruit unknown."

The Sphagnaceæ are briefly described, and references are made to monographs for details. It is to be regretted that a whole plate was not devoted to them, and some of Braithwaite's excellent illustrations of the leaf- and stem-structure given, especially as the other plates, with one exception, are those used by Sullivant.

The Hypneæ are given in one genus with 28 sub-genera and 195 species.

As the name implies, Alaska, British America, Greenland and the United States are included in the range of the mosses, but Mexican species are omitted, which is a disappointment, as they are to be found in Rau and Hevey's Catalogue of N. A. Mosses. However, as a description of them would have entailed a further delay, since the Mexican collections are chiefly to be found in German Herbaria, we can excuse this omission and hope to see a demand for a Bryologia Americana on the scale of the Bryologia Europæa at no distant day.—ELIZABETH G. KNIGHT.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XI.] New York, July, 1884. [No. 7.

New North American Fungi.

By J. B. Ellis and Benj. M. Everhart.

Æcidium Ligustici.—Cups small, margin narrow, subentire, collected in clusters 2–3 mm. in diameter on the under side of the leaves. Spores irregularly globose, 18–20μ (orange?) The upper side of the leaf is obscurely marked with pale, yellowish spots, indicating the position of the *Æcidium* opposite.

On *Ligusticum Scoticum* from the Island of Anticosti (Gulf of St. Lawrence), August, 1883. Prof. J. Macoun (No. 311.)

Septoria aciculosa.—Perithecia innate-superficial, mostly in clusters of two or three together, black, minute, on the lower face of the leaf. Spores acicular, continuous, 12-20x1μ. Accompanied with *Sphærella Fragariæ*, Tul.

On strawberry leaves. Anna, Ill., May, 1883. F. S. Earle.

Septoria Pentstemonis.—Perithecia punctiform, black, epiphyllous, on small, white, round, thin spots, with a dark, purple-shaded border; spores cylindrical, slightly curved or undulate, 14–20x1μ, faintly nucleate.

On leaves of *P. digitalis*. Anna, Ill., June, 1883. F. S. Earle.

The perithecia are visible on both surfaces of the leaf, but open above.

Excipula subcalva.—Excipulum thin, substriate, 150–200μ in diameter, margin incarved when dry, jagged and uneven from the unequally developed tips of the brown, elongated constituent cells; basidia slender, branching 50–75μ long, bearing at their tips the minute (3–4 x .5–.75μ) oblong-cylindrical spores.

On fallen leaves of *Quercus obtusiloba*. Newfield, N. J., May, 1882.

Hendersonia platypus.—Seated on oblong or roundish white spots 2–4 x 1–2 mm., perithecia punctiform, black, subelongated; spores mostly oblong elliptical, but rather variable in size and shape, mostly 12–15 x 3.5–4μ, but some of them shorter and broader, and some longer (19μ) and narrower, all 3-septate, yellowish-brown, on pedicels about 7μ long, with a broad base. The cuticle of the cane is soon eaten away in the white spots, leaving the surface of the inner bark exposed in the shallow depressions thus formed. Accompanied with a *Phoma* (*P. lethalis*, E. & M.) having small subglobose (2 x 1.5μ) brownish spores.

Differs from *H. sarmentorum*, West., in its smaller perithecia on white spots, and its rather smaller spores on pedicels swollen at the base. On living canes of *Rubus villosus* and *R. Canadensis*. Cobden, Ill., Feb., 1884. F. S. Earle.

PEZIZA EARLIANA.—Erumpent, scattered, liver-color; darker when dry, closely surrounded by the epidermis, hemispheric and nearly closed at first, at length expanding so as to show the pallid disk; margin suberoded, minute (.12–.17$^{mm.}$); asci sessile, oblong, 50–55x12μ; paraphyses stout, and, when mature, distinctly and abruptly swollen at the tips; sporidia crowded, oblong-cylindrical, obtuse at each end, 3–4–nucleate, hyaline, 15–18x 2.5–3μ.

Differs from *P. Dehnii*, Rab., in its smaller size, scattered mode of growth, broader asci, larger sporidia and club-shaped paraphyses.

On the under side of dead leaves of *Fragaria*. Anna, Ill., May, 1883. F. S. Earle.

NECTRIA CANADENSIS.—Perithecia cæspitose, ovate, .33$^{mm.}$ broad by about .5$^{mm.}$ high, densely tuberculose-granulose, dull red; ostiola broad, obtuse, not prominent, but distinctly stellate cleft and slightly collapsing when dry; asci and paraphyses evanescent, the former about 75–80x10–12μ (spore-bearing part); sporidia irregularly crowded, hyaline, oblong, 3-septate, slightly curved, ends obtuse, 18–21x7–9μ.

The conidial stage is a *Tuberculariа*, .5–2$^{mm.}$ high, with an orange-colored head bearing oblong, 5–7x1.5μ conidia and brick-red stem bursting out through cracks in the bark in continuous series two or three inches or more in extent. From the basal portion of this *Tuberculariа* the perithecia arise, and finally entirely surround and overtop the orange heads of conidia, which are either entirely hidden or remain partly visible in the midst of the dense clusters of perithecia.

Allied to *Sphæria pseudotrichia*, Schw. On bark of elm limbs. Ottawa, Canada, August, 1883. Macoun (No. 311.)

BOSELLINIA MACOUNIANA.—Gregarious, superficial, ovate, .33$^{mm.}$ in diameter, covered, with the exception of the prominent ostiolum, with a coat of short, light purplish tomentum; asci long and narrow (100μ and over); sporidia uniseriate, overlapping, 19–22 by about 6μ, 2–nucleate, brown, oblong or subnavicular.

On rotten wood. Ottawa, Canada, Oct., 1883. Macoun (No. 253.) From other localities I have received specimens of what appears to be the same, only with the perithecia denuded and black (old) and much resembling old specimens of *Sphæria subiculata*, Schw., which, in the absence of the yellow evanescent subiculum, may be distinguished from this by its smaller (10–13μ long) sporidia.

NUMMULARIA PEZIZOIDES. — Stroma carbonaceous, erumpent, superficial, depressed-obconic, black outside and rufous brown within, about 1$^{cm.}$ broad and .5$^{cm.}$ thick, with a narrow sublobate margin; disk thickly studded with the strongly prominent, papillate ostiola; perithecia flask-shaped, or subangular by compression, about 1$^{mm.}$ high; sporidia narrow-elliptical, a little bulging on one side, brown, 1–2-nucleate, 11–13 x 4–5μ.

On bark. Ottawa, Canada, Oct., 1883. Macoun (No. 228). Since found at Topeka, Kansas, by F. W. Cragin.

The specimens being rather old, the asci had disappeared. This has the general appearace of a thick, narrow-margined *Peziza*, and, judging from the description of that species, must be much like

Nummularia Moselei, Berk., but is apparently distinct. The Kansas specimens were on decorticated wood and were rather smaller.

PLEOSPORA CLARKEIANA.—Perithecia minute (.1$^{mm.}$), membranaceous, scattered, sunk in the substance of the leaf, the upper part slightly projecting and closely covered by the blackened epidermis, and finally collapsing; ostiola scarcely prominent; asci subcylindrical, 125 x 25μ; sporidia biseriate, pyriform or oblong, mostly slightly constricted across the middle, about 7-septate, becoming muriform and brown.

On dead leaves of *Plantago maritima?* Island of Grand Menan, (Maine), June, 1884. Miss C. H. Clarke. Allied to *P. Heleocharidis*, Karst, but asci and sporidia smaller.

SPHÆRELLA GALLÆ.—Perithecia minute, scattered, or in groups of 2–3 together, rupturing and loosening the epidermis; asci 40–45 x 10μ, sessile; sporidia crowded in 2–3 series, slender, clavate, 1–septate, 12–15 x 3μ (at the broad end).

On galls of *Vaccinium corymbosum*. Newfield, N. J., July, 1883.

Notes on the Botrychia.—I give some facts that struck me in recently gathering specimens of *Botrychium rutaceum*, Sw., and *B. lanceolatum*, Angst. The peculiarity of their growth is this: they are found at the head of a ravine, in shade, but generally in shaly soil that is almost barren of small undergrowth, and has but a slight covering of vegetable mould—sometimes none at all. They were so mature on June 28th that a tiny cloud of spores flew from the fertile fronds the first time they were touched. They grow in little colonies here and there where the soil seems to be suited to them. The two species grow together, *B. rutaceum* having sterile fronds that are almost uniform in width throughout, and pinnules that are broad, blunt and toothed. *B. lanceolatum*, on the contrary, is deltoid in shape, and has comparatively long and narrow pinnules. There is also a form of *B. rutaceum* in which the sterile frond is almost as finely incised as in *B. ternatum* var. *dissectum*. This is exceedingly pretty and delicate.

I had been quite inclined to believe that these two species were in reality only different forms of the same thing. They grow in the same locality, and often close to each other. But proximity by no means signifies consanguinity, and small forms of *B. Virginicum* grew there even more plentifully than either of the others, although it preferred the vegetable mould. So I made an examination of the bud forms and found them to agree substantially with Mr. Davenport's descriptions. There was a slight difference in the *rutaceum*, or *matricariæfolium* as he designates it, if I understand his description aright. He says: "the apex of the *fertile* frond is *bent downward* in the bud toward the sterile frond, which clasps it with its side divisions and bends its apex downward over the whole." In my specimens the fertile frond is shorter than the sterile in the bud, and stands up perfectly straight; but it is clasped by the sterile frond exactly as he describes. Both the figure and description of *B. lanceolatum* that he gives are capital, and cannot be bettered.

There is in my herbarium a monstrosity of *B. rutaceum* in which

the sterile frond is four inches long, with a terminal pinna, and four pinnæ on each side, opposite to each other. The pair next to the lowest measures an inch and a half from tip to tip; but the lowest pinnæ are each 1.75 inch long, making the pair measure 3.5 inches. All but these are at right angles to the rachis, but the lowest pair projects forward so as to form a V which encloses two-thirds of the upper part of the frond. They are fully an inch from the junction of the rachis with the stipe. The fertile frond is divided into three main branches, each of which is decompound and about three inches long. The entire plant is twelve inches high. It came from the same locality that I have described above.

I have also to report the presence, at a roadside in the town of Deerfield, Oneida Co., N. Y., of a considerable amount of *Trifolium stoloniferum*, Muhl., which is scattered along for half a mile or more. How it came there I have not been able to learn, and I can find no record of its occurrence elsewhere in this State. The street is two or three miles from the N. Y. Central Railroad, and, although it is an old one, as is indicated by an occasional Lombardy poplar, it is not much travelled save by the residents. Under such circumstances the plant would hardly be apt to come in of itself as a straggling immigrant. Possibly it may have come with cattle brought from the west.

Utica, July 9, 1884. BENJ. D. GILBERT.

Lonicera grata.—A year ago I sent a line to the BULLETIN asking for information about *Lonicera grata* in its indigenous habitats. Not having obtained much satisfaction, I renew the inquiry. Does any botanist now know of this plant in the "Cedar Swamps of New Durham," or in Darlington's habitats on "Ridley Creek," and on "the Brandywine above the Forks." As to Dr. Torrey's plant, he says he had not seen it in flower, and the specimen in his herbarium I suppose to be *L. parviflora*, Lam., *i. e.*, *L. glauca*, Hill.

A. GRAY.

The Range of Phoradendron.—Mr. J. Schneck's interesting notes on *Phoradendron*, its habit and range, in the *Botanical Gazette* for June and July, lead me to record the probability that its northward extension along the Atlantic coast was formerly greater than at present. Its most northern stations in the immediate vicinity of the coast at present known, is at Lakewood, N. J. (W. Bower, A. C. Apgar). The station noted by Mr. Canby, between Trenton and New Brunswick, is probably a few miles further north. In 1879, while preparing the Flora of Richmond Co., N. Y., with Mr. Arthur Hollick, we were credibly informed that, only a few years before, the mistletoe was growing on sour gums near Clifton, and a note was made to that effect; since then I have been shown a locality in that neighborhood by Mr. R. S. Newbury, of New York, where he had seen the plant in former years. The *Nyssa* was there—several very old, decaying trees—but no *Phoradendron*.

N. L. BRITTON.

The Mistletoe (*Viscum album*, L.).—Forgotten or not, the mistleto is perhaps the most distinguished plant in the flora of England. Its name has been spelt in more ways than any other well-known word in our language. Mistleto itself has been a problem to etymologists, and there is the usual divergence of opinion on the subject. Prior thinks it means the "mixed" shrub, from its appearance, so different from its parent stock. Forby thinks mislinbush means the "golden bush," from a Saxon name of a kind of brass. Virgil speaks of it as the *ramus aureus;* a German poet has called it *die goldfärbte mistel*, and the Welsh have named it *pren puraur* or "tree of pure gold." But the Saxon name mentioned by Forby means nothing but "mixed metal," so at best this etymology is only a step in the explanation. In reality it means the "dung twig" or "shrub." The final syllable "-to" or "-den" corresponds to the Anglo-Saxon *tan*, "a twig." Mistel is derived originally from a Sanskrit word meaning "excrement." The name may possibly refer to the slimy mucilage surrounding the seeds, but more probably to the way in which the plant is propagated. The missel thrush or missel bird is really the mistleto thrush, and it is so named because of its great fondness for the berries. Like the nutmeg-pigeon of the Spice Islands, which eats the nutmeg fruits, digests the pulp, and expels the seeds which we call nutmegs, sometimes carrying them many miles from the parent, the missel thrush, by, eating the berries, is the chief agent in preserving the species.

Viscus or *viscum* is the Latin name for this plant; botanically it is distinguished as *Viscum album*. It is sometimes difficult to separate the meaning of *viscus*, the mistleto, from *viscus*, glue or birdlime, for making which the mistleto was formerly esteemed inferior only to the holly. And the word *viscera*, which is connected with them both, points to the original meaning of all three. *Vish* is the Sanskrit root, meaning to "separate" or "disjoin." One of its numerous derivatives is *vishta*, "excrement," and thence comes *viscum*. With *viscum* is connected a long series of words. The *iks*, *iksos* and *iksia* of the Greeks, called *biskos* in the Beotian, and *fiskos* in the Arcadian dialect, the Italian *vischio* and the Portuguese *visgo* are all related to it. The French is *gui;* in the Berry dialect this is *guè* in Norman *vi* or *vi de pommier;* in Aube *avi* or *havi*, and in Manche *wi*. The Celts or Gauls are said to have called the plant *visca* and *viscus*. *Gwysglys* is the Welsh representative of the same word. *Gwysgenlyd* and *gwysgonlys*, also Welsh, are probably connected with it. *Guis*, an old Erse name, means "mistleto" when a noun, and "viscous" when an adjective. In parts of Prussia the plant is called *wispe*, which may be connected with *viscum*, though it is more probably related to the *vespelt* of West Gothland, which, according to Grimm, means "holy wheat." This name is rather obscure. The dedication of the plant to Freya, or its worship by the Druids, may account for the epithet holy, but the connection of the plant with wheat is not easy to trace. Bock, a German botanist of the 16th century, states that in times of scarcity poor folk have gathered, dried, and powdered the plant, and, mixing it with rye-flour, have made a not unwholesome bread.

Trollope tells us that the plant is called in Breton *lou-zou-ar-*

groas, "herb of the cross," and that the Breton peasants put a bunch of it in their pockets when they start on a carousal. In Normandy at the present day a branch of this "sacred plant" serves as a sign for the drinking-houses (*cabarets*), and "with an apple placed amongst its golden branches it announces 'new cider.'" In the department of the Aube it is called *enseigne de cabaretier*.

Vert de pommier (the "greenness of the apple-tree") is Norman, perhaps connected with *verquet*, another name in provincial French. Connected with it in idea is the Breton *dour-dero* or *deur-derv*, "water (or juice) of the oak," and the Erse *sugh-darach*, "sap (or juice) of the oak." In German the common name for the parasite is *affolter*. This is also applied to the guelder rose. It is spelt, when applied to the mistleto, *apfolter afholder*, and in old High German the corresponding words are *affoltera* and *apholtera*. The word is exactly equivalent to the English "apple-tree."

Brou, a name in use in the Department de l'Aube, really means the cuttings of hedges, which are given to goats, and has been applied by extension to the mistleto, of which those animals are very fond.

Marentacken (German) and *maarenzacken* (Dutch) are names sometimes applied to the mistleto. They mean, literally, "spectre's twig." The first half of the name corresponds to the latter half of the word "nightmare." It need hardly be said that neither has any connection with horses, the word "nightmare" meaning simply "night spectre," or "ghost." A twig of mistleto held in the hand was formerly supposed to give the power of seeing ghosts and compelling them to speak. In the Netherlands it is believed that a branch of it hung at the bed's head will prevent the nightmare. In some parts of England the mistleto is still believed in as a protection against witchcraft. These facts are sufficient to show that the name *marentacken* is not meaningless, but they do not explain how the name or the ideas arose.

Kinster, *kenster*, *künster*, *genster*, *künst*, and *kinst* are the various forms of a German name which, like most of the names of the mistleto in that language, has been confused with the title of a totally different plant. The name *genster* is also given to the *genista*, or broom, and there seems to be some organic connection between the German and the Latin. The German *kenster* and its other forms are probably related to the Walloon *canista* (Champenais dialect), *hènistai*, *hènistrai*, *hinistai*, *hinistrai*, and *hennesa* (Ambleve dialect). It is probable, but not certain, that these words have the same origin. They seem to be connected with the Latin and Low Latin *canistellus* and *canistrellus*, "a little basket." "The metaphor is easily understood, for the mistleto looks like a basket of flowers suspended from a branch. The German *kinster* may even be the Latin canister. Two German names, *kluster* and *kleister*, seem related in idea to *kinster*.

Kreuzholz, "wood of the cross," and *heilige kreuzholz*, "wood of the holy cross," are German names corresponding to the *lignum sancti crucis*, said by Minsheu to be an Italian name for the plant, and with the Breton *louzou-ar-groas* "herb of the cross." "In the

West of England there is a superstition that the cross was made of mistleto, which until this time had been a fine forest tree, but was condemned henceforth to lead a parasitical existence." There is no doubt that this legend was invented by Christian missionaries. Reverence for plants and animals is the most difficult form of superstition to eradicate, and the expedient of giving the superstition a fresh direction has been frequently adopted. *Heiligheu* or "holy hay," is another German name.

Vogel-leim in German means both birdlime and mistleto. *Liga* (Spanish) signifies the mistleto, birdlime, a garter, and a league. Its derivation is self-evident. *Pania* and *paniaje* are Italian names for the plant. *Pania* means also "birdlime," and is evidently connected with *paniccia*, "paste," and *pane*, "bread." *Adabac*, *dabac*, *debach*, and *debkh* (Arabic) are connected with the Hebrew *debkh*, "that which adheres." *Glu* is both provincial and dictionary French, connected with our word glue, and meaning both mistleto and birdlime, and *glutier* is a Norman name for the plant. In Walloon we find the word *verjalle*, which generally means birdlime, but in some dialects is applied to the mistleto. Literally it is *petite verge* or "little rod." Limed twigs probably form the connecting idea. Birdlime was formerly made from the berries of this plant by crushing them when ripe, carefully separating the pulp from the skins and seeds, and boiling it for some time. It was then laid in a cool place, and, after fermenting a long time, it was washed with water to separate the branny particles, and was then ready for use. At a very early date it was used for catching small birds, and at the present day large numbers of nightingales are taken by its means.

In the Limbourg dialect of Walloon the names *hamustai* and *hamustaine* are used. In the Ardennais dialect the latter is contracted to *haustaine*. These words seem to be identical with the Anglo-Saxon *acmistel*, or oak mistleto.

In Walloon we find also the names *anse-di-pot*, or "pot-handle," which Grandgagnage says "explains itself," and *insitia*, from *insitellum*, a derivative of *insitum*, meaning "a grafted branch."

In the dialect of the Aube (France) we have *blondeau*, *bouchin*, *breton*, and *louvotte*. *Breton* may refer to its worship by the Bretons; *louvotte* closely resembles *louvette*, a name in another district for the *Allium vineale*, which is doubtless connected with *loup*, "a wolf." This species of *Allium* is known as crow garlic, and in the Aube it is called *Porre-au-loup*. *Muerdago* is a Spanish name for the plant. The names in the Slavonic languages are very much like each other, but we do not know their meaning. Thus the Bohemian is *melj*, *milii*, *melij*, *gmelj*, or *omeli;* Russian, *omela;* Polish, *jemiola* or *jemiel;* Lithuanian and Lettish, *amalai*, *æmalus*, and *ahmals*. These are strangely like the modern Greek names, *melios*, or *melias*. The glistening berries are sometimes called by the French *pomme hemorrhoidale*, and the Portuguese call them *pommo hemorrhoidal*. They do not seem to have been ever used as a cure for piles; their resemblance to the disease probably gave them the name. Some of the Celtic names still remain to be mentioned. The commonest and most important is *gwid*, *gwidhel*, or *gwydhel*, litterally "*the* shrub."

The root is a fruitful one in Welsh. From meaning simply shrub, it came to be applied to bushy places, to wild places, to wild animals and the rude inhabitants of wild places, and to rudeness and savagery. In another direction it became applied to the worshippers of trees and shrubs, to the Druids, to the marks which distinguished the Druids from the common people, and thus it came to mean knowledge and science. *Heonllys* (Welsh) is from *llys*, "a plant," and *heon* a name under which the chief deity was worshipped by the Welsh bards. *Uchelawg* means "a lofty thing," *uchelfa* "a high place," *uchellawr* "the most exalted," *uchellawg* "having a lofty site," *uchelwydd*, *ycheluydh* "the lofty shrub," or "the branch of excellent virtues." All these are Welsh names for the plant. We find also *uchelfar*, *uchelfal*, *uchelfel*, *uchelvar*, *ychelvar*, Welsh; and *huel-varr*, *uchel-varr*, *ihuel-varr*, *inhuel-varr*, Breton; meaning (according to the Welsh etymologists) "lofty summit." Corresponding with these in idea is the Walloon name *hautèdame*, from *hautè*, "high," and *dame*, of unknown meaning. *Prenawyr* and *awyrbren*, Welsh names, mean the "ethereal tree." *Holliach*, or *ol-hiach*, Welsh; *uile-iceadh*, or *uile-iceach*, Erse; *uile-ic*, *uileice*, *uile-ice*, and *uil-ioc*, Gaelic; and *ollyiach*, Breton, are names for this plant. The the last means also a nostrum or panacea. The first means, when an adjective, "perfectly well in health." All are compounded of two words, *uile*, "all," "the whole," and *ioc*, "medicine," "healing," "rent," or "payment." Pliny records the fact that the Druids called the mistleto by a name meaning in their language "all-healing." Some etymologists say that mistleto itself is derived from *meist heil tan*, the "most healing twig." *Heil aller schäden*, "heal all wounds," is a German title of the plant; and a MS. list by Robert Brown (preserved in the botanical department of the British Museum) records the name "all heal" as a Scotch name.

Besides these we have the Welsh *glyd* and *ysglouring*, of doubtful authenticity.

One of the Danish names is *vintergrönt*. There is a similar name for the parasite in Swedish, and their meaning is "wintergreen," from the evergreen character of the plant.—*Abstract of a paper by W. G. Piper.*

Cones Wanted.—Baron F. Thümen, of Görz, Austria, wishes specimens of cones of North American conifers. It makes no difference whether the cones are with or without seeds, but it is very necessary that they shall be accurately determined. The Baron offers in exchange copies of his Mycotheca Universalis or of his publications on forestry-mycology, or payment in money.

Botanical Notes.

Sisyrinchium.—W. B. Hemsley points out the differences between the Bermudian *Sisyrinchium* and the Eastern North American plant, which latter he now refers to *S. angustifolium*, Miller, *S. Bermudiana*, L., not being native with us. Mr. Hemsley remarks as follows: "*S. Bermudiana* differs from *S. angustifolium* in being much larger in all its parts, and strikingly so in its broad leaves, which are equitant at the base."—*Journ. Bot.* xxii., 108.

Carnivorous Plants.—Although physiologists have universally accepted the facts originally proposed by Darwin as correct, yet there has been a disposition in some quarters, if not to question the fact, at least to doubt its utility. Mr. Francis Darwin undertook some experiments to satisfy the latter point, and now we have to record the results of some experiments made by M. Busgen. This gentleman commenced his experiments with seedling Droseras, and ascertained that the digestion of nitrogenous matter begins with the appearance of the first leaf. The experiments were continued for two years, with the result that those plants "fed" with nitrogenous diet in the shape of aphides and small insects were the more vigorous. Fourteen plants so treated produced seventeen flower-stalks and ninety seed-pods, while sixteen plants not so treated produced only nine flower-stalks and twenty seed-pods. More conclusive still were the results of analysis, which (we cite from the *Annales Agronomiques* 1884, p. 238) showed for the first set a total weight of dry matter (remaining after the expulsion of water by heat) of 0.352, while the unfed plants yielded only 0.119 parts of a gramme (= 15 grains).—*Gardeners' Chronicle.*

Timber in Texas.—As an illustration of the extent of the timber trade in North America the following extract from a recent report from Texas will be of interest: Notwithstanding the fact that the greater proportion of the State consists of immense prairie, Texas possesses the largest area of woodlands of any State in the Union. The timbered country is situated in Eastern Texas; and, according to the Forestry Report, in 1880 there were 63,000,000,000 feet of standing pine, worth, on the average at the mills if sawed up into planks, 12 dollars per 1,000 feet. Besides pine there are large quantities of cypress timber, both red and white, from which roofing shingles are made. At Beaumont these mills turn out 250,000 daily, and at Orange six shingle mills made during the year 1881 66,000,000 cypress shingles. Bois d'arc (*Maclura aurantiaca*) is very abundant in some counties, and for posts is unsurpassed, as it will last for years in the ground without rotting. It is also used for carriage and waggon spokes, and it is also coming into use for paving streets.

Favorable Influence of Climate on Vegetation in Alaska.—In some remarks before the Philadelphia Academy of Natural Sciences, upon glaciers in Alaska, Mr. Thomas Mechan observed that on the tops of what are known as "totem-poles" in some of the Indian villages, trees of very large size would often be seen growing. These poles are thick logs of hemlock or spruce, set up before the door of Indian lodges, carved all over with queer characters representing living creatures of every description, and which are supposed to be genealogies, or to tell of some famous event in the family history. They are not erected by Indians now, and it is difficult to get any connected accounts of what they really tell. At the old village of Kaigan there are numbers of poles erected, with no carving at all on them, among which many are wholly covered, and these all had one or more trees of *Abies Sitkensis* growing upon them. One tree must have been about twenty years old, and was half as tall as the pole on which it was growing. The pole may have been twenty feet high.

The roots had descended the whole length of the poles, and had gone into the ground, from which the larger trees now derived nourishment. In one case, the root had grown so large as to split the thick pole on one side from the bottom to the top, and this root projected, along the whole length to the ground, about two inches beyond the outer circumference of the pole. Only in an atmosphere surcharged with moisture could a seed sprout on the top of a pole, twenty feet from the ground, and continue for years to grow almost or quite as well as if it were in the ground.

At this village he also saw a bush of *Lonicera involucrata*, which was of immense size as compared with what he had seen in Colorado and other places. The plant was growing on a bank and rose some ten or twelve feet, when it bent over and rested on the roof of the lodge, its numerous branches making a dense arbor under which the road passed. The stems near the ground were, some of them, as thick as his arm, and the whole plant was covered with very large black berries. Subsequently another specimen was noted in the woods on a plant of the native hemlock, *Abies Mertensiana*. In the woods the plant is somewhat sarmentaceous. It could not climb a hemlock without assistance. This old hemlock was bereft of branches to a height of about twenty feet, but the *Lonicera* was above the lower branches, and had journeyed along them to the extremities, beyond which it was beautifully in fruit. It could have been there only by growing up with the hemlock when that tree was young, and was probably of about the same age.

Butterflies as Botanists.—The caterpillars of *Mechanitis*, *Dircenna*, *Ceratinia* and *Ithonia* feed on different species of Solanaceæ (*Solanum*, *Cyphomandra*, *Bassoria*, *Cestrum*), those of the allied genus *Thyridia* on *Brunfelsia*. Now this latter genus of plants had been placed unanimously among the Scrophularineæ, till quite recently it was transferred by Bentham and Hooker to the Solanaceæ. Thus it appears that butterflies had recognized the true affinity of *Brunfelsia* long before botanists did so. There is yet another and more curious instance of our butterflies confirming the arrangement of plants in Bentham and Hooker's Genera Plantarum. *Ageronia* and *Didonis* were formerly widely separated by lepidopterists, being even considered as constituting distinct families, but now they are to be found beside one another among the Nymphalinæ, and the structure of their caterpillars leaves no doubt about their close affinity. The caterpillars of *Ageronia* feed on *Dalechampia*, those of *Didonis* on *Tragia*. Now these two Euphorbiaceous genera were widely separated by Endlicher, who placed the former among the Euphorbiaceæ, and the latter among the Acalypheæ; Bentham and Hooker, on the contrary, place them close together in the same subtribe of Plukenetieæ, and thus their close affinity, which had been duly appeciated by butterflies, has finally been recognized by botanists also.—Fritz Müller, in *Nature*.

Fish killed by Utricularia.—Prof. Baird has recently received from Prof. H. N. Moseley, of England, a specimen of *Utricularia vulgaris*, L., holding in its embrace a number of young fish which it had caught. This plant has long been known to entrap the lower

forms of animal life in its bladders, and to derive nourishment therefrom through absorption, but its fish-catching proclivities have only recently been noticed. Mr. G. E. Simms, of Oxford, England, was the first to call attention to the fact upon finding that a specimen of the plant which he had placed in an aquarium was actually entrapping large numbers of perches and roaches which had recently hatched from a mass of eggs lying at the bottom. These little fishes were usually caught by the head, but some were caught by the tail, and others were doubly trapped, the head being held fast in one trap and the tail in another. In order to learn something of its destructive powers, Mr. Simms placed 150 perch fry in a vessel containing specimens of *Utricularia*, and, at the end of two days, found that all but one or two had been entrapped.

Proceedings of the Torrey Club.—The regular meeting of the Club was held at Columbia College, Tuesday evening, May 13th. In the absence of the presiding officers, Mr. Braman occupied the chair.

Mr. Bicknell exhibited double-spurred specimens of *Viola canina*, var., *sylvestris*, and a white-flowered form of *Aquilegia Canadensis*, from Riverdale. Miss Knight showed specimen of *Aralia trifolia* with aborted flowers in the axils of extra leaves, from Hunt's Point.

Miss Steele exhibited *Sisymbrium alliaria* from Flatbush, L. I.

Mr. Hollick referred to the separation of sexes in *Antennaria plantaginifolia*, the male flowers always congregating in one group and the female in another, the two being seldom if ever united.

Mr. Bicknell read a communication upon the differences between *Carex Pennsylvanica* and *C. varia*, and some notes upon the time of flowering of other species.

On motion it was ordered that the local herbarium of the late Mr. Leggett be purchased.

Two corresponding members were elected, and four names were prepared for active membership.

The regular meeting of the Torrey Club was held Tuesday evening, June 10th, at Columbia College. In the absence of the officers Mr. Schrenk was called to the chair and Dr. Britton acted as Secretary; fifteen members were present. Four persons were elected active members, and one person a corresponding member.

The Chairman of the Herbarium Committee stated that the local plants of the Leggett herbarium had been secured for the Club's herbarium.

Mr. Bower exhibited many luxuriant fresh specimens of native plants from his Newark garden.

The following field excursions were reported:

May 17th, Todt Hill, Staten Island.—Prunus Americana; Cerastium oblongifolium; Viola pedata; Clematis ochroleuca—some of the plants having incised leaves; *Orchis spectabilis* and *Aphyllon uniflorum* were collected. The Chairman requested members to notice the parasitism of the last-named plant, saying that his recent observations had confirmed his former ones of its constant attachment to some species of golden-rod.

May 24th, Closter, N. J.; nothing of special interest noted.

May 30th to June 2d, Northern Morris and Sussex Cos., N. J. At Newfoundland, *Arenaria lateriflora* in quantity, and *Ranunculus aquatilis*, var. *trichophyllus* were noticed. At Sparta and Morris Pond, a charming region was found. A sand-hill near the depot was covered with *Lupinus perennis*. It was noticed that the standard petals of lower flowers were dark purple, while those of the upper, later ones were of a much lighter color. The same plant was seen from the cars at several places west of Newfoundland, forming dense, broad patches. *Arabis lævigata ; Zizia integerrima* and *Asplenium Ruta-muraria* were collected in this vicinity, and *Viola blanda* was found in great abundance in the ravine leading to Morris Pond. Dr. Britton called attention to the supposition of some botanists that there are two species included under this name, *i. e.*, the larger variety, in which the peduncles and sometimes also the petioles are flecked with red (*V. amœna*, Le Conte.), and the small obtuse-leaved, unspotted form, by some considered the type. Both were noticed, but also all stages of gradation between them. On the meadows bordering the Wallkill River, above Ogdensburg, *Geum rivale, Castilleia coccinea* and the leaves of *Parnassia* were seen in abundance; *Rosa blanda* and *Arabis lyrata* were found on Stirling Hill, and *Viburnum Opulus* in the town. At Hamburg, were observed *Larix Americana* and *Arabis perfoliata*—the latter new to New Jersey.

June 6th, Carlstadt, N. J.—Among many plants collected were *Magnolia glauca, Lysimachia thyrsiflora* and, in the ditches, *Anacharis* in flower.

Miss Knight remarked upon the forms of *Rhododendron viscosum* noticed, and showed specimens of varieties *nitidum* and *glaucum*.

Mr. P. H. Dudley then exhibited and remarked upon a series of photo-micrographs of transverse, radial and tangential sections of some American timber-trees taken by him with ordinary lamplight. They were enlarged 100 diameters. Among them were *Sequoia sempervirens*, in which attention was called to the very large cells—none less than one-tenth of an inch in length—and to the fact that in this and other conifers examined the pit markings of the cell-walls are seen in abundance in only radial sections; *Catalpa speciosa*, now used for railroad ties in the west; and *Ailanthus glandulosus*, in which Mr. Dudley had noticed the greatest number of and largest ducts in any wood yet examined by him. In *Liriodendron* the ducts are very numerous but small; in the osage orange the parenchymatous tissue within the ducts is plainly noticeable; in the white oak, chestnut and black walnut Mr. Dudley had observed that these parenchyma cells in drying, shrink away from the walls of the ducts and from each other, and then appear as separate vesicles. He also showed a photograph of a section of a decayed white oak railroad tie with the mycelia of fungi.

BULLETIN

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A List of Cyperaceæ

Collected by the late Mr. S. B. Buckley from 1878 to 1883 in the Valley of the Lower Rio Grande, in Texas and Northern Mexico.

By N. L. Britton.

Cyperus flavicomus, Torr.—A large form with rays five inches long, 30–45-flowered spikelets, and scales of a rich chestnut-red color, the nuts persistent.

Cyperus microdontus, Torr., var. *Texensis*, Torr.—I do not agree with Nr. C. B. Clarke* in reducing this plant to a variety of the tropical *C. polystachyus*, Röttb.

Cyperus erythrorhizos, Muhl.—A form only three or four inches high, cæspitose; resembling the var. *pumilus*, Engelmann, in Torrey Herbarium, from St. Louis, to which I refer also the *C. occidentalis*, Torr., from the Northwest coast by Dr. Hooker, and from the mouth of the Willamette River by the Howell brothers.

Cyperus erythrorhizos, Muhl.—A large, erect form, with rays and involucral leaves also erect; otherwise hardly differing from the type. I refer to this Nos. 876, 2,306, and 3,223 of the Herbarium Berlandierianum, Texano-Mexicanum, and, with some hesitation, a specimen collected by Dugès at Guanajuato,† the "tule grande" of the Mexicans. These forms may later be best considered as a variety to be known as var. ERECTUS.

Cyperus aristatus, Röttb. (*C. inflexus*, Muhl.)

Cyperus cyrtolepis, Torr. & Hook.

Cyperus rufescens, Torr. & Hook., var. DENTICARINATUS, *n. var.* Scales with a prominent keel, which is armed with small hyaline teeth near its apex. Stamen solitary. Umbel appearing somewhat lateral.

Cyperus Drummondii, Torr. & Hook.

Cyperus aureus, HBK., i., 205, (?).—Agreeing quite well with the description, and the same as a fragment so named in Herb. Torrey, collected at Havana by D. B. Greene. The present specimens have the following characters: Culm one to two feet high, smooth. Leaves about the length of the culm, three lines wide, smooth. Involucre of about six, much elongated leaves, and several short ones. Umbel of about ten rays, two or three inches long, and several nearly sessile ones, the stronger rays compound, involucellate. Heads composed of 6–14, linear, obtuse spikelets, which are 3 or 4 lines long. Scales ovate, mucronate, loosely spreading, and curving upwards, of

* *Journ.* Linn. Soc. xxi., 55.

† See Mr. Watson's List in *Proc.* Amer. Acad., xviii., 170.

a bright yellowish-brown color. Achenium shorter than the scale, oblong, acute, sharply triangular in section. Style somewhat lengthened, 3-cleft. Stamens 3.

Cyperus filiculmis, Vahl.

Cyperus Schweinitzii, Torr.

Cyperus Fendlerianus, Bœckel., in *Linnæa*, xxxv., 520.—The species is distinguished from *C. Schweinitzii*, Torr., by the very short-rayed heads forming a dense, compact inflorescence, and the strongly mucronate scales, whose tips are horizontal or downwardly curved. It is No. 875, Fendler, Plantæ Novæ-Mexicanæ, and was collected also at Silver City, N. M., by Dr. H. H. Rusby in 1880.

Cyperus Buckleyi, *n. sp.*—Culm quite stout, triangular, smooth, one to two feet high. Leaves long, linear, about 3 lines wide, smooth. Involucre of about four, mostly elongated, linear, smooth leaves. Rays of the umbel about five to seven, the longest about four inches in length. Spikelets broadly linear, .5 to .75 inch long, 15 lines wide, 12–20-flowered, clustered in loose heads of 12–30 at the ends of the rays, spreading or in part reflexed, their axes zig-zag, not winged. Glumes oblong, or oblong-ovate, obtusish or truncate, with a dark keel and lighter brown, somewhat scarious margins, prominently 9–11-nerved. Achenium obovate, very sharply triangular, obtuse, with a short point. Stamens 3.

Cyperus articulatus, L., var. conglomeratus, *n. var.*—Spikelets 1–15 inches long, in dense clusters on the ends of short rays, showing a compact, glomerate inflorescence two to three inches in diameter.

Cyperus dissitiflorus, Torr.

Cyperus esculentus, L. (*C. phymatodes*, Muhl.).—Several forms; among them, one with the short rays and spikelets erect.

Cyperus strigosus, L.—A slender form with the spikelets disposed in loose clusters, and diverging at right angles from the axes.

Cyperus setigerus, Torr. & Hook.

Cyperus lutescens, Torr. & Hook.—The spikelets in these specimens are fewer-flowered than the original description calls for, but otherwise they agree very well with it, and with the specimens in Herb. Torrey and in Dr. Gray's Herbarium.

Cyperus Michauxianus, Schultes.—Numerous specimens; among them, one with more spreading scales, and answering to the description of *C. ferruginescens*, Bœckel.*; also a specimen with pale brown spikelets.

Cyperus oxycarioides, *n. sp.*—Culm about two feet high, smooth, bearing on its lower portion about three elongated, linear leaves (8–10 inches long, 3 lines wide), which are slightly rough-margined. Involucre of about six elongated leaves, resembling those of the culm. Inflorescence of a single, terminal, dense, globular head, about an inch in diameter, composed of a very great number of sharply acute, teretish, about five-flowered spikelets, one-eighth to one-quarter inch in length. Scales oblong-ovate, acutish. Achenium triangular, oblong, acute, about one-half the length of the scale, (one-half line long.) Stamens 3. Resembling the genus *Oxycaryum*, Rees, in outward appearance.

* *Linnæa*, xxxvi., 396.

Cyperus ferax, Rich.—Agreeing with the description except in the darker brown spikelets. I have seen no authentic specimens, and refer Mr. Buckley's to this species with some doubt.

Cyperus Baldwinii, Torr.

Cyperus ovularis, Torr.

Cyperus cylindricus, Britton, in BULL. TORR. BOT. CLUB., vii., 48.

Cyperus flavus, Vahl. (*C. flavomariscus*, Griseb.)

Cyperus uniflorus, Torr. Also a form with 3-5-flowered spikelets.

Cyperus uniflorus, Torr., var. PUMILUS, *n. var.*—Culm about three inches high, equalling the leaves. Inflorescence of a single, occasionally slightly compound head of from 8 to 20 spikelets, mostly composed of three glumes; the lower persistent, empty; the middle one fertile; the upper sterile, subulate. I refer here also No. 350, Palmer, Indian Territory.

Fuirena squarrosa, Michx. Also var. MACROSTACHYA, *n. var.*—Spikes 8 to 12 lines long, lanceolate, stout. Perianth-scales tipped with a downwardly-barbed awn of their own length, or longer. Plant one to two feet high, stout; leaves broadly linear, nearly smooth, some of them slightly ciliate towards the base.

Hemicarpha subsquarrosa, Rees.

Heliocharis equisetoides, Torr.

Heliocharis obtusa, Schultes.—A form with fewer scales.

Heliocharis palustris, R. Br.—Several forms, including the var. *calva*, Gray, with bristles absent, and one with very large tubercles on the achenia.

Heliocharis capitata, R. Br. (The *β*, Torr. Cyp. p. 305.)

HELIOCHARIS TEXANA, *n. sp.*—Culm very slender, less than half a line wide, three-angled, apparently erect. Spikes linear, slightly compressed or terete, one line wide, .5 to .75 inch long, acutish. Scales very numerous, the lowest ovate and obtusish, the others ovate-lanceolate and acute, all with broad hyaline margins. Achenium obovoid, contracted at the neck, tipped with a conical, acute tubercle. Style deeply three-cleft, roughened. Stamens three, longer than the achenium. Bristles none.

Heliocharis acicularis, R. Br.—A large form.

Scirpus pungens, Vahl.—Specimens with 3-cleft styles, and bristles as long as the achenia.

Scirpus validus, Vahl.

Scirpus maritimus, L.

Scirpus lineatus, Michx.

Fimbristylis spadicea, Vahl., var. *castanea*, Gray.

Fimbristylis laxa, Vahl.

Fimbristylis autumnalis, R. & S.

Fimbristylis capillaris, Gray.

Fimbristylis congesta, Torr.

Dichromena leucocephala, Michx.

Phoradendron.—Dr. Britton's note in the July BULLETIN reminds me that twenty years ago I was cognizant of the presence of a large bunch of *Phoradendron* on an old *Liquidambar*, at the roadside, about three and a half miles north of Keyport, N. J. It was on

the Willett farm, not many rods from the shore line of Raritan Bay. In the winter, as a green tuft about as large as a bushel measure, on the naked tree, it had a curious look. The best of my recollection would place it about half a mile north of the lighthouse. Some four years ago I looked for it, but though I found the old gum-tree, the parasite was gone.

Euphorbia Cyparissias.—In July, 1884, I saw a magnificent patch of this elegant spurge on a high bank at the edge of an oak wood, about two miles from Colt's Neck, N. J., on the road to Holmdel. From the size and compactness of the mass, and the length of the horizontal roots, as shown by the crumbling bank, it was plain that it had been long established. It was far away from any house, and the original plant must have come from seed dropped by a bird. The patch presented one of the most beautiful sights I have ever seen. I was pleased to find near by the spurge, that pretty milkweed, *Asclepias verticillata.*

S. Lockwood.

Michaux's New Jersey Garden.

By H. H. Rusby.

The exact location of Michaux's garden, at New Durham, N. J., has repeatedly been sought by local botanists, partly for its historical interest, and partly in the hope that some relics of its founder's planting might remain. Through the courtesy of some friends, descendants of his associate, Pierre Paul Saunier, an opportunity was recently afforded me of visiting the place, and fixing accurately the boundaries of the garden, the location of the building, and even the exact arrangement of the planting of many of the shrubs and trees.

It will be remembered that Michaux came to this country in the year 1785, being then thirty-nine years old, accompanied by Mr. Saunier, seventeen years of age. He was the representative of the French government, his duty being to collect and send home roots and seeds of such plants as were considered worthy of cultivation. The better to accomplish this purpose, the garden at New Durham was established. When he embarked for Europe in 1796 the garden and commission were transferred to Mr. Saunier, and afterwards to the latter's oldest son Michel, who continued to make shipments nearly to the time of his death. Mr. Saunier's two sons and two daughters, married and brought up families, and all are now represented by descendants in this country. My information was obtained from Mrs. Sarah A. Williams, of New Durham, and Mrs. Eliza Hanna, of Franklin, daughters of Michel Saunier. The former lady, and Miss Euphemia, a daughter of the latter, accompanied me to the site of the garden and pointed out the old land-marks.

The garden included most of the land now occupied by the Hoboken Cemetery, or at least most of that portion now* laid out. The southern boundary coincided with the present southern boundary of the cemetery, while the northern boundary included a little more

* June 21, 1884.

than that of the cemetery. Eastwardly it extended nearly to the top of the hill, although there was no regularity in the planting of this upper portion, which was very rocky, and was soon converted into an orchard. The garden was not confined to this space, but extended upon the western side of the road to, and even into, the swamp. The entrance was a few yards south of the present cemetery-entrance, and from this point a carriage-drive swept round to the door of the house, which stood a short distance northeast of the present porter's-lodge, the carriage-house standing on the site of the latter building. Later, this building was abandoned, and another was built upon the other side of the road, close to where the old pear-tree now stands; but this too has now disappeared. A school-house stood just south of the garden, and was subsequently converted into a blacksmith-shop.

This space, of about eight or ten acres, served the double purpose of a fruit and vegetable garden (supplying such articles of necessity and luxury as in those days could be had only from one's own garden) and a botanical garden, in which were transplanted in large quantity such natural species as appeared likely to prove useful or ornamental. As might be expected, but little was done in the introduction and distribution of exotics, although to Michaux and his successor is accredited the intoduction of the original stocks of most of the Lombardy poplars and flowering almonds in this country.

Most of the interesting shrubs growing within a radius of twenty-five miles were planted in sufficient numbers to yield a large quantity of seeds, while others there were, collected on excursions to distant localities, represented by only one or two specimens. The former were planted in long rows, and many of them are remembered by Mrs. Williams growing in their original position. Along the southern boundary was planted arbor-vitæ, which, under the name of horse-saffron, was in demand by the settlers far and wide as a veterinary remedy. Later, this hedge served as an excellent cover from which marauding parties of boys from the school hard by made raids upon the old gentleman's fruits and flowers, the pretty but deceitful crabs, and a variety of pear, with tiny fruits growing always three in a cluster, tempting the urchins to predatory feats of the utmost daring. Next this hedge was a row of *Chionanthus*. The northern side of the garden was selected for the taller species, including the persimmon, catalpa and several species of oaks not to be found in the woods close by. The drive was bordered for one-half its length by flowering almonds, while between it and the school-house, near the road, was a large space filled with the sweet shrub (*Calycanthus*), which is remembered as having attained a prodigious size for this species. Other rows are remembered as containing mountain laurels and weeping poplars. In front of the house stood "a small tree called 'leather-wood,'" which is probably the "very large *Dirca palustris*," which Mr. Le Roy writes to me that he well remembers. Just where the bell-house now stands was a cluster of immense rocks, now covered to form to form a mound, where these grandchildren remember having played among the prickly ash and barberries, in the shade of a group of sassafras-trees. The west side of the road was deemed most suit-

able for chinquapin and swamp magnolias, and there was planted another large group of *Kalmias*, than which these early collectors, like ourselves, seem to have found no shrub more admirable.

In addition to the seeds collected from the gardens and the forests about it, many were collected to order by the settlers living at a distance, and brought on their occasional visit to the sea-board. In this way Michaux obtained his stock of "scrub-oak" (*Q. ilicifolia*) from Paramus, just north of Hohokus. The seeds were kept dry and cool until just before the departure of a vessel, when they were packed "in iron-hooped boxes, between layers of rotten wood," in which condition many of them were sprouted on their arrival in France. It is believed that no shipment was ever lost by wreck. Mrs. Williams graphically describes the appearance of the wagons, with their great stacks of boxes, looking at a distance like loads of hay. She also remembers the steady decrease in the orders, until finally the shipments ceased, nearly fifty years ago, with one of three small boxes.

Reference is made to the extensive forests of *Cupressus thyoides* that bordered the swamp, and extended into it in the form of peninsulas and islands. It is definitely stated that while part of this died, as it is now doing, by the depression of the land, the most of it was cut away to be used in fencing; for the value of this timber, on account of its lightness and durability was early recognized.

Of everything planted by Michaux and Saunier it is probable that not a vestige remains except two old pear-trees, one in the cemetery, the other just across the road, and of the history of these nothing positive is known. A double row of Lombardy poplars planted by Mr. Saunier for "old Mr. Stevens," remained until quite recently, when they were destroyed in grading. Even the orchards are gone. The only positive living relics are two plants of *Berberis vulgaris* taken from the garden by Mrs. Williams and now growing in her door-yard at New Durham.

It seems eminently fitting that the Torrey Botanical Club should erect a monument to this excellent man and botanist, upon the spot which, the scene of his loving and conscientious labors, has so strangely become set apart as a depository for memorials of the dead.

A Botanical Trip into Northern New Jersey.—The evening of the 16th of last July found me under the hospitable roof of Rev. Mr. Clarke, of Stillwater, Sussex County. Early next morning his two sons, students in Lafayette College, drove me three miles, to the southwestern extremity of Swartswood Lake. On the edge of the stream near the outlet, the following plants were noted: *Cicuta bulbifera*, L., *Myosotis laxa*, Lehm., *Peltandra undulata*, Raf., *Sparganium eurycarpum*, Engelm., (in fruit), *Pontederia cordata* L., and *Equisetum limosum*, L. Taking a boat, the young men rowed me up the western shore, three miles, to the head of the lake. This shore has a few low limestone bluffs and sheltered coves between. The water is shallow, and our course lay through acres of *Nymphæa odorata*, Ait., and *Brasenia peltata*, Ph. Underneath, at a depth of three feet or more, the bottom is covered everywhere with the dark, regularly disposed, plume-like, waving stems of *Potamogeton Robbinsii*, Oakes, amongst

which are to be seen, here and there, patches of *P. amplifolius*, Tuckerm., distinguished by its lighter yellowish hue, and broad leaves curiously twisted and curled. In one of the coves we came upon *Nasturtium lacustre*, Gray, (in flower and fruit). I had collected it during a former visit (Sept. 2, 1879) at a single station, but now it was observed at various places from the head of the lake to the outlet. The leaves, both those above the water and those beneath, are very easily detached, so that it is difficult to make complete specimens. At this spot we fished up half a dozen stalks of *Ranunculus aquatilis*, L., var. *divaricatus*, Chaix. (in flower), and *Potamogeton lucens* (in flower and fruit). The opposite border of the cove is lined with a dense growth of *Saururus cernuus*, L., conspicuous by its nodding spikes of fragrant flowers. This plant is common all along the Paulinskill Creek from the lake to the Delaware, fifteen miles, but, strange to say, it has been observed, as yet, on that river, only at Trenton, about seventy miles further down. As we passed around the main bluff, or promontory, some bushes of *Myrica cerifera* were seen on its slopes, and at its base, a solitary *Salix lucida*, Muhl. From this point we proceeded over a considerable bay to the northeastern end of the lake and glided into an area, several acres in extent, occupied by *Nelumbium luteum*, Willd. The vernation of the leaves is involute. Some project themselves above the water, whilst the others stop at the surface. These latter in unfolding assume the form of a bowl, or basin, or inverted skull-cap, and are very pretty objects as they float. When fully expanded, they are of a deep green color above and lie flat on the water, which, cast upon them by the dip of an oar, rolls and divides itself like quicksilver, emitting a brilliant silvery light. The cause of this phenomenon is worthy of investigation. The leaves of *Orontium aquaticum*, L., behave in the same way. To our great disappointment not a single flower could be discovered in the entire colony. It may have been too early for their appearance, or else the summer lodgers of the neighboring hotels and farm-houses had gathered them all. A little further to the east, I looked for *Heleocharis quadrangulata*, R. Br., where I had discovered it September 2, 1879. It was now in flower, and still plentiful. In coasting back along the eastern shore we found *Taxus baccata*, L., var. *Canadensis*, Gray, as abundant on the rocks as in September, 1879. On one of the undisturbed and untilled islets in the middle of the lake, it was a surprise to see *Solanum Dulcamara*, L., flourishing luxuriantly amongst the aboriginal vegetation.

After dinner, at 2 P.M., Mr. P. P. Clarke drove me over from Stillwater to Blairstown, six miles, in order to take the evening train at that place. For three miles along the road the eye was attracted by the frequent occurrence of *Zanthoxylum Americanum*, Mill., *Rosa rubiginosa*, L., and *Cnicus pumilus*, Torr. Midway on the route, we turned into a lane, to the left, and soon reached a lakelet of oblong shape and about three-fourths of a mile in length called White Pond. A white line of shell-marl all around its margin indicates the origin of the name, it lies in Warren County close to its Sussex boundary. The boat we had counted on for the work of circumnavigation could be seen some distance out on the water, occupied by two men, who were

fishing for black bass. Our exploration had, therefore, to be done on foot, and so we tramped for nearly one-half a mile through a wide swamp on the border of the pond. The plants noted and collected here were: *Sarracenia purpurea*, L., and *Prunus Virginiana*, L., (in fruit), *Potentilla fruticosa*, L., (in flower and abundant), *Parnassia Caroliniana*, Mx., and *Menyanthes trifoliata*, L., (leaves), *Rhynchospora capillacea*, Torr., *Carex flava*, L., (over ripe), *C. Œderi*, Ehrh., (in good condition) and *Bromus Kalmii*, Gray. Of these, two (*Rhynchospora capillacea*, Torr., and *Carex Œderi*, Ehrh.) are new to the flora of New Jersey. *Carex flava*, L., was collected years ago by the late Dr. A. P. Garber in Sussex County, where he also obtained *Lobelia Kalmii*, L., but the latter was sought for in vain. The results of my visit to the charming lakelet gave me so much pleasure that I mean to see more of it at an early day.

Easton, Penn. THOS. C. PORTER,

Sweet Cicely as a Bur.—Yesterday, while rambling among the shady ravines and hillsides of the Virginia shore of the Potomac, and immediately above this city, I observed that my clothing was bristling with slender, spindle-shaped burs, some of which made their presence felt by penetrating to my skin. Spanish needles! I said; but no, I had not seen the plant that day. A glance showed that they were the linear fruits of *Osmorrhiza longistylis*, very abundant there, its foliage wholly gone and leaving the dry branching stalks loaded with fruit which only needed to be touched to be shaken off, and through dense patches of which I had been walking. I had never been thus troubled before and my curiosity was excited, as I was not aware of this bur-like nature of the sweet cicely. It was useless to remove the burs till I had wholly left the place, when I made a business of it.

On carefully examining the seeds after I reached home I easily discovered the secret. The narrowed base of each fruit terminates in a sharp spinous point, and this is backwardly bearded with stiff, white bristles, closely simulating in form and function the grains of some Aristidas and other grasses. Wondering why I had not always known this, I at once turned to the books to see how the authors had described this peculiarity. To my great surprise I was unable to find any distinct mention in any work at my hand of this, certainly the most striking character of the genus. Bentham and Hooker's "Fructus * * * basi longius attenuatus; carpella * * * sursum ciliata" certainly does not describe it. Gray says: "Fruit * * * tapering downwards into a stalk like base * * * the carpels with *upwardly* bristly ribs;" while Chapman contents himself by merely mentioning the "carpels with bristly ribs." It seems clear that the function of these bristles and the narrowed base, as a means of distribution like other burs, cannot have been present to the minds of any of these authors, and I write this partly to ask where the discovery of this function in *Osmorrhiza* has been formally announced, if anywhere.

The barb being at the base of the seed, or at the point of attachment to the plant, it is necessary that it shall first drop off and depend upon finding the distributing agent in the course of its fall of

two or three feet. It is clear that the device is a somewhat clumsy and ineffective one, but the habit of the plant to grow in dense patches renders the chances of success fully adequate to its needs, as any one may easily realize by walking through half an acre of it as I did.

Washington, D. C., August 16, 1884. LESTER F. WARD.

Germination of Pardanthus Chinensis.—Two years ago I described and figured what seemed to me a peculiar mode of germination of *Iris versicolor* (BULLETIN, Vol. ix., No. 6). The seeds of *Pardanthus Chinensis* seem to germinate in exactly the same manner, as shown by the annexed figure. The seed (*sd*) stays under the surface (*sf*) and sends out a long connective (*ct*), bearing the cotyledon (*cn*) from which are developed the root and the leaves (*ls*).

I must assume that in this case we have to deal with a normal mode of germination, for I found numerous seedlings in the open ground, around an old plant that had been freely fruiting the previous fall, and all of them showed the same peculiarity.

(*Pardanthus Chinensis* has been known for many years to grow abundantly near Richmond Hill, Long Island.)

Hoboken, July, 1884. JOS. SCHRENK.

Celtis occidentalis, L.—A specimen of this tree is growing on Main St., in West Springfield, which is notable for its great size as also for its perfect shape. The following careful measurements show that it is not the "small or middle-sized tree" as described in Gray's Manual: circumference four feet from the ground, twelve feet and three inches; height, seventy-five feet and six inches; spread of branches, eighty feet. This locality seems to be a favorable one for the development of this tree. Though only a few specimens have ever been known here, they have all reached a great size. One is standing in Springfield nearly as large as the one whose measurements are given above. Two formerly stood on Main Street, which were a little larger than either of these now standing. They received special mention in Emerson's book. They were still vigorous and sound when cut down a few years ago. The two large ones now standing are apparently in all the vigor of middle life, making considerable growth each year. It is to be hoped that they will be spared to reach their greatest possible development.

Springfield, Mass. GEO. W. PERRY.

Æcidium Jacobeæ, Grev.—This *Æcidium* is a true heteroecismal uredine as I have recently demonstrated, and is not, as has hitherto been supposed, connected either with *Puccinia glomerata* or *P. compositarum*. On the contrary, it has its teleutospores upon *Carex arenaria*. This *Puccinia* is quite different from *P. caricis*, from which it can be

readily distinguished by the naked eye. It is more nearly allied to *P. dioica*, Magnus, but whether these two species are identical I can at the present moment hardly say.

King's Lynn, Eng. CHARLES B. PLOWRIGHT.

Berteroa incana, placed by Bentham and Hooker under *Alyssum*, but known among other things by its bifid petals with expanded saccate bases, has appeared spontaneously in several places in our city. It was first seen by Mr. J. L. Bennett.

In a field with the above I have found a fine plant of *Sonchus arvensis*.

Providence, R. I. W. WHITMAN BAILEY.

Rudbeckia Missouriensis.—This is between *R. hirta* and *R. fulgida*, but more closely allied to the latter. *R. Hirta*, as compared with *fulgida*, commences to flower three weeks earlier. When cut through longitudinally the receptacle is narrowly conical, almost lanceolate. The leaves are wide in proportion to length, and remotely edged with minute serratures. The stems and leaves are very rough. The habit is widely branching.

R. fulgida begins to flower three weeks later, has a broadly ovate, somewhat triangular receptacle, narrow leaves, with remote toothed, deeply cut edges, and the stems and leaves clothed with short, soft hair. The habit is somewhat erect.

R. Missouriensis opens with *fulgida*, has still narrower leaves than *fulgida*, and the receptacle is broadly ovate as in *fulgida*, though more acute at the apex. But the narrow leaves are quite entire, and the whole plant more rough than even the rough *R. hirta*. There is a greater tendency in the ray-florets of *R. Missouriensis* to become "quilled," as the florists term it, than in those of the others.

T. MEEHAM.

Botanical Notes.

Histo-Chemistry of Plants.—In an interesting contribution to the "histo-chemistry" of plants (*Monatshefte*, v., 94) Herr Rosoll illustrates the light that can be thrown upon vegetable principles by studying them microchemically *in situ* in the plant. The first plant mentioned is *Helichrysum bracteatum*, the yellow flower-heads of which are well known as a variety of "everlasting flowers." This yellow color is very persistent, but when the dried flower-heads are dipped into borax solution to which hydrochloric acid has been added, the involucral leaflets become of a beautiful ruby-red color. Further investigation showed this yellow pigment to be a hitherto undescribed quinone-like substance, which Herr Rossoll has named "helichrysin." In the younger leaflets it exists in combination with protoplasm, whilst in the older ones it has its seat in the residual cell contents. Helichrysin is soluble in water, alcohol, ether and organic acids; insoluble in benzol, chloroform and carbon bisulphide; is colored purple-red by mineral acids and alkalies; and is precipitated by metallic oxides and their salts as a red colored extract. The same

body appears to be present in *H. orientale*, *H. fœtidum* and *Statice Bonduelli*. Passing to the fungi, the organs of fructification of *Peziza aurantia*, with their yellow disk and lighter outer side, were examined. It was found that the orange color is due to a new yellow pigment, that has been named "pezizin," which is present in the form of extremely minute drops combined with an oil-like substance that occurs dissolved in the plasma of the paraphyses. The pigment, which occurs also in *P. convexula*, may be dissolved out by alcohol or ether. Saponin was ascertained to occur in the living roots of *Saponaria officinalis* and *Gypsophila Struthium*, dissolved in the cell juice, from which it can be separated in small amorphous white particles by treatment of thin slices of the root with absolute alcohol or ether. In the dried roots and in quillaia-bark it occurs as an amorphous white or gray substance. By treatment with concentrated sulphuric acid and exposure to air, which gives rise to a yellow, then a bright red and afterwards a beautiful blue-violet color, saponin can be detected in the contents of all the cells of the middle bark of *Quillaia saponaria*.

Botanical Literature.

*On the Indian Species of Cyperus, with Remarks on some others that specially illustrate sub-divisions of the Genus.** By Charles Baron Clarke, F.L.S., F.R.S. With four plates.

This valuable contribution to Cyperology treats of many of our American species, based on specimens mainly by the older collectors in the Herbaria of Kew and Calcutta. Numbers of them are referred to older names than those found in our manuals, etc., and others regarded as species are reduced to varieties. The changes in nomenclature proposed by Mr. Clarke are as follows:

C. microdontus, Torr., and var. *Texensis*, Torr., including *C. Gatesii*, Torr., are refered to *C. polystachyus*, L., a widely distributed species in the warmer regions of the eastern continent, under the varietal name *holosericea*; *C. fugax*, Liebm., of Mexico, becomes var. *paniculata* of the same species, and *C. Nuttalii*, (Eddy) Torr., becomes var. *filicina*, although, as Mr. Clarke remarks, it may best be regarded as a species; the form of the last-named plant described as *C. Cleaveri* by Dr. Torrey is also made a variety of *C. polystachyus*, var. *Cleaveri*; the original specimens from Monmouth Co., N. J., as well as recent ones collected by Mr. C. F. Parker at Cape May, N. J., with various intermediate forms between them and *C. Nuttallii*, indicate, as Dr. Torrey later suggested, that it is merely a depauperate form of this plant, not worthy of varietal rank. In these reductions Mr. Clarke follows the ideas of Bœckeler. *C. divergens*, Chapm., is made *C. leucolepis*, Carey, MS. *C. ambiguus*, Liebm., of Mexico, becomes *C. Olfersianus*, Kunth. *C. diandrus*, Torr., var. *castaneus*, Torr., is restored to specific rank under the name *C. rivularis*, Kunth, a change in which we are not ready to concur. The *C. flavicomus*, Torr., Mex. Bound. Survey, is referred to *C. Hochstetteri*, Nees. *C. inflexus*,

*Journ. Linn. Soc., xxi., 1–202.

Muhl., is *C. aristatus*, Röttb., a change already noted by Mr. Watson in the Botany of California. *C. rotundus*, L., a species of tropical distribution, includes var. *Hydra*, Gray, Manual. *C. esculentus*, L., is the older name for *C. phymatodes*, Muhl., and *C. Hermanni*, Buckley, (var. *Hermanni*, Watson) is included by Mr. Clarke. *C. Grayii*, Torr., is referred to *C. setifolius*, Torr., we suppose an older manuscript name, having found no such published description of the plant, though it was made a var. *setifolius* of *C filiculmis*.—N. L. BRITTON.

Desmids of the United States and List of Pediastrums; with 1,100 *Illustrations on* 53 *colored Plates.* By Rev. Francis Wolle, 8vo. pp. 168. Bethlehem, Pa. 1884.

Although we have never specially studied the subject of fresh-water algæ, we have more than once had occasion to consult the pages of Rabenhorst to ascertain the name of some beautiful desmid which we have observed floating in the field of the microscope, and we know from so slight an experience as this how difficult it is to identify these minute plants without the aid of accurate figures. Those many readers of the BULLETIN who have, during the last few years, turned their attention to the study of these low forms of vegetable life, will heartily thank Mr. Wolle for placing at their disposal a work in which all obstacles of this nature are removed through the eleven hundred colored figures which he has given them, and which illustrate all the species and varieties that are described in the text.

The desmids, the group of fresh water algæ to which this work is specially devoted, embrace a large number of species, some of them of most exquisite forms, and the publication of a work like the one under consideration must certainly have the effect of giving a further impetus to the study of them among those who have a microscope at their command, and who desire to know more about the inhabitants of the unseen world.

As regards paper and letter-press the book is handsomely got up, the illustrations are beautifully drawn and colored, and we scarcely see how the author is able to offer the work to students at so low a price as five dollars.

Vacation Cruising in the Chesapeake and Delaware Bays. By J. T. Rothrock, M.D., Professor of Botany in the University of Pennsylvania. Philadelphia: J. B. Lippincott & Co., 1884.

It is rather late in the season to allude to this charming little book by a botanist whose name is familiar to all our readers, but it is none too late to recommend the perusal of it to those who, before many months elapse, will be laying plans for next year's vacation, and who, like our author, may have the means at their command to spend it upon the water, and in their own craft. But in making these remarks we do not mean that the reading of the book should be restricted to the class that we have just mentioned, for it is very pleasantly written, full of instruction, and will prove equally interesting to all those whose destiny compels them to while away their vacation hours upon dry land.

Correction.—On page 64, line 17, read Fig. A is a node, *p* is a petiole scar.

BULLETIN

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Corema Conradii and its Localities.

By JOHN H. REDFIELD.

Referring to Dr. Gray's exhaustive paper in Chloris Boreali-Americana* for a full description and careful figures of this species, and for an account of its morphological relations, the object of this article is simply to place on record such facts connected with its known localities and environment as may tend to elucidate the past history of a plant now so sparsely represented in the existing flora. While its near relative, *Empetrum nigrum*, abundantly clothes the mountain heights and colder regions of the northern hemisphere, our *Corema* is restricted to very limited spaces in widely separated localities, in the district extending from New Foundland to New Jersey. Having been favored with opportunities to examine the principal known localities within our own limits, my notes will follow, as nearly as may be, the order of their discovery.

1. *New Jersey Pine Barrens.*—It is said to have been first discovered by Prof. Solomon W. Conrad as early as 1831 near Pemberton Mills, about ten miles from Burlington, N. J., and a fragment so ticketed (with a ?) is in the herbarium of the Philadelphia Academy. Soon after, Rafinesque collected it at Cedar Bridge, Monmouth Co., about twenty-two miles south-east of Pemberton. This locality was visited about 1833 by Dr. Torrey, who published the first description of the plant under the name of *Empetrum Conradii*, in *Annals* of N. Y. Lyceum of Nat. Hist. iv., 83. In April, 1869, in company with the late Charles F. Parker, I made some examination of the vicinity of Pemberton and also visited Cedar Bridge in search of the plant. The encroachment of cultivation near the former place discouraged search, but at Cedar Bridge the localities which Dr. Torrey in his paper has so carefully indicated were readily identified. But no trace of the plant was seen either at these points or elsewhere during a search of some hours. Dr. Torrey described it as growing in a few patches "in the pure white sand of that region." These places, as I now remember them, were quite bare of vegetation at that early spring season, but the prevailing tree growth of all that region is a very stunted form of *Pinus rigida*. At the time of Rafinesque's and Torrey's visits, Cedar Bridge was an inn for the accommodation of the limited summer travel of that period by stage-coach between Philadelphia and Barnegat Bay. Now alas, an occasional clam-wagon is the only visitant, and as I remember the

* *Memoirs* of Amer. Acad. Arts and Sciences. 2d series iii. pp. 3-14, tab. i. (1846.)

house in 1869 it was as rough a hostelry as it has been my lot to encounter. I have some doubt whether Conrad's and Rafinesque's localities were not the same.

Dr. Knieskern is said to have found the plant at other points in Monmouth Co., but this has not been confirmed, nor is the *Corema* enumerated in his Catalogue of the plants of Monmouth and Ocean Counties published in 1856. There is, however, a large tract of absolute wilderness lying between the New Jersey Southern R. R. and Barnegat Bay which may reward exploration.

2. *Long Island.*—Dr. Torrey, in the Flora of New York ii., 519, says that Dr. Emmons had given him specimens of *Corema* collected, as nearly as he could remember, "on the road from Oyster Bay to Hempstead, but possibly near Islip." It does not seem to have since been found, and Mr. Coles, of Glen Cove, "has sought it very generally in Queens and Suffolk Counties in the most likely places without even finding a single specimen." (BULLETIN OF TORREY CLUB iii., 5) and Mr. E. S. Miller in his careful Catalogue of the Plants of Suffolk Co., does not enumerate it.

3. *Plymouth, Mass.*—This is the best known and most abundant locality, and has furnished most of the specimens hitherto found in our herbaria, and was mode known in 1838 and 1839 by Tuckerman, Oakes and others. Mr. Tuckerman recognized the Plymouth plant as identical with that from Cedar Bridge described by Dr. Torrey, and communicated specimens with ripe fruit to Dr. Klotzsch of Berlin, who in 1841 proposed to separate it from *Empetrum* under the name of *Tuckermannia.** This name had, however, been already applied by Nuttall to a California Composite, and so Tuckerman, in London *Journal of Botany* i., 445, in the year 1842, proposed for it the name of *Oakesia* in compliment to William Oakes. Dr. Gray, however, in the paper referred to at the head of this article, showed that there was nothing in the generic character to separate it from the existing genus *Corema* established by Dr. Don in 1826 upon *Empetrum album*, L.

In visiting this locality, August 7th, 1885, I had the company of Dr. Gray and the guidance of Benj. M. Watson, Jr., Professor of Horticulture in the Bussey Institute. I found it presenting an aspect very different from those yet to be mentioned. Here I saw the plant, as Emerson† well describes it, "clothing one open, sunny hill of some acres, strongly reminding one of the description of the heaths of Europe." This hill, like most of those in the vicinity, is a deep deposit of gravel largely composed of quartz. Where the rains have washed out the loamy vegetable matter the residuum is a coarse sand much like that of the Jersey barrens. I am sure that there is more of the plant here than in all the localities I have yet to mention, and Mr. Watson informed us that the tenure of the land is such that the *Corema* is not likely to be disturbed for many years to come, and will never be ruthlessly destroyed. Portions of it had apparently died out, probably from the extreme drought of 1883,

* Erichson Archiv., 1841, p. 248.

† Trees and Shrubs of Massachusetts. 1st edition, 1846, p. 328.

but new seedlings are springing up, and we may hope that it will long remain as one of the many attractions of the beautiful town which bears so many rich historical associations. The tree growth around is sparse, composed mostly of *Pinus rigida* with some *Quercus coccinea* and *Betula alba*. The *Corema* covers the position so thoroughly that there is room for little other undergrowth, but occasional plants of *Gaylussacia resinosa*, *Vaccinium vacillans*, *Comptonia asplenifolia* and *Baptisia tinctoria* are seen.

Mr. Watson informed us that he had also seen the *Corema* near Truro, Cape Cod, and near one of the coves of Buzzard Bay.

4. *Bath, Maine.*—In 1840, Mr. W. Gambell, a pupil of Nuttall, furnished to Dr. Gray specimens of *Corema* gathered in the spring of 1839 "on the rocky banks of the Kennebec in the neighborhood of Bath." Since then little seems to have been known of this locality. On the 5th of August, of this year, I visited Bath for the purpose of making some search in that vicinity. Bad weather shortened my visit and prevented me from examining the banks of the Kennebec; but a few hours spent upon the high grounds west of the city led me to a second range of hills covered with a dense young growth of trees, much of it white pine. On the higher part of the ridge, where the granitic rocks crop out into bare ledges some acres in extent, I found a considerable quantity of the *Corema*, perhaps in all twenty patches, all within the limit of a few rods. The rock contains a large proportion of quartz, and the scanty soil showed much silex. Here the tree growth was *Pinus rigida* in scattered, stunted examples, with some few small trees of *Betula alba*. As this locality was not near the banks of the Kennebec, but two miles west of them, I was at first inclined to believe it new, but I have since been informed that Prof. Goodell had collected the plant, probably at the same point, and also on the eastern bank of the river.

5. *Isle au Haut, Maine.*—This is the outermost island in Penobscot Bay, about six miles in length, two and a half miles in width, the central ridge rising to a height of 400 to 450 feet, being the highest island upon the coast except the mountainous one of Mount Desert. It is mostly wooded, but has on its northwesterly side a scattered village of about 200 inhabitants, who live upon the produce of the sea, and it is said that the first horse seen upon the island was landed only two months ago. The island has hitherto been rather inaccessible, but will doubtless soon become a summer resort and be made more easy of approach. The existence of *Corema* here was first discovered by A. Young, Jr., a student of Bangor, who communicated the plant to Dr. Gray in October, 1847. Mr. Young found it upon the high barren summit of the island, in considerable abundance, associated with *Potentilla tridentata*. I visited the island July 21st and 22d, 1884, and in the first house I entered it was my good fortune to meet an accomplished botanist, Mrs. Flora E. Haines of Bangor, who had spent several summers here and whose familiarity with the topography, botany and local history of the island relieved me from the loss of time and the possible failure which might have attended the hurried visit of a perfect stranger. Under her guidance the summit of the island was

reached, doubtless the point visited by Mr. Young. There we found the *Corema*, but only sparingly. The hill-top had been overrun by fire a few years ago, and it was evident that the plant had narrowly escaped extinction. This fact is a suggestive one as connected with the very local distribution of our *Corema*, and it is very probable that a similar cause has been for ages narrowing its field of existence. Yet some new sprouts gave promise of good increase if botanists give it fair treatment. The scanty soil in which it grows is composed of a finely comminuted granite of which quartz is the chief ingredient. Associated with the *Corema* were *Potentilla tridentata*, *Vaccinium Pennsylvanicum*, *Cornus Canadensis*, with here and there a stunted spruce.

I was then conducted to a bare, round, rocky knob, perhaps 150 feet in height, about 1¾ miles W. S. W. of the locality just mentioned, and overlooking Moore's Harbor. This hill has the local name of "Black Dinah," and on its summit the *Corema* grows in sufficient abundance, in numerous large patches after the manner of *Empetrum*. The rock is composed almost entirely of quartz, and the scanty soil is made up of its particles, and an occasional rock crevice gives foothold for the firmly rooted *Corema*. The associated plants were mainly the same as in the locality last mentioned, except that a few dwarf examples of *Pinus rigida* were scattered about. I was informed that a third locality exists on the rocky shore between Black Dinah and the little village opposite Kimball's Island, and another on the eastern side of the island. *Empetrum nigrum* is also found on Isle au Haut, and on the neighboring Kimball's Island, and is very abundant on many of the rocky headlands of Mt. Desert twenty-five or thirty miles distant, and I have recently been informed that *Corema* has been seen upon Green Mt., the highest part of Mt. Desert, but I need some more positive evidence that the plant there seen was not *Empetrum*, and further search in other of the many large islands of Penobscot Bay some of them many square miles in area, and upon the numerous promontories of the main land will probably yet reveal other localities

Nova Scotia and Newfoundland.—Mr. Tuckerman saw in the Lambert Herbarium in London specimens collected in Newfoundland by Cormack. In Nova Scotia it has been seen in Halifax Co. by Lindsay and Sommers, and at Wilmot, Annapolis Co., by Howe. I know nothing further as to these localities, but hope that our botanical brethren from the British Provinces will give us further facts.

7. *Shawangunk Mts., N. Y.*—All the localities hitherto mentioned are maritime, or so near the sea-coast that when in 1881 it was announced that the *Corema* existed in Ulster Co., N. Y., on a mountain top, eighty miles from the coast, some surprise was created, and botanists were led to call to mind how, in like manner, *Hudsonia* and *Leiophyllum* are perfectly at home on mountain summits in North Carolina. Mr. Smiley, proprietor of the Minnewaska House, a well-known summer resort in the Shawangunk Mountains, in 1881 called the attention of Aubrey H. Smith to the plant, who identified it as *Corema*, and reported the fact to the Botanical Section of the Phil. Acad. (See *Proc.* Phil. Acad., 1882, p. 35). Mr.

Charles E. Smith visited the locality May 2d, 1882, obtained good flowering specimens, and published his notes in the TORREY BULLETIN, Vol. ix., 1882. My own visit to the locality was June 26th, 1884, at which time the fruit was just perfecting. The Shawangunk Mountains consist of long, narrow ridges, extending from the Rondout Valley, southwesterly into New Jersey, crossing the Delaware River at the Water Gap, extending thence through Pennsylvania into Virginia. By the New York geologists the formation was named the Shawangunk Grit, and it is by Dana, in the latest edition of his Manual of Geology, referred to the Oneida Group. It is almost entirely composed of sand-stones and conglomerates, and is remarkable for the number of lakes or ponds which are found at frequent intervals throughout its extent, and of which L. Mohonk and L. Minnewaska are examples. The ridge at L. Minnewaska, and that running southwest from it, forming the easterly wall of Palmaghett Glen are of nearly pure quartz rock, bearing a scanty growth of scrub pine and white birch. The latter ridge extends about two miles, is then broken by a deep depression, rising again into a promontory called Gertrude's Nose. The height is from 1,500 to 1,800 feet above the sea. Following this ridge for nearly two miles beyond the lake, we find the *Corema* in frequent patches along the open sunny spaces on the western side of the path along the brow of the ridge, over a space of several hundred yards in length. Occasional starved examples of *Pinus rigida* are the only tree growth, and the associated plants are *Kalmia angustifolia*, *Gaylussacia resinosa* with some *Kalmia latifolia* and *Gaultheria procumbens*. The scanty soil in the rock crevices and on the rocks is of course derived from the pure quartz rock. On the ridge, beyond the depression above mentioned, the *Corema* is said to grow in still greater abundance, but I was not able to reach that point. I think we need be under no apprehension of the exhaustion of the plant by collectors, but the danger of destruction by fire is much greater.

I have thus given the facts connected with the distribution of this interesting species. I believe that a consideration of them will lead to discoveries of new localities, and to an extension of its known field. It is curious that the first discovery of the plant was made at the extreme southern end of its known area, at points where it seems not to have been abundant, and from which it has disappeared.

The Microvegetation of Bank-Notes, by Dr. Jules Schaarschmidt, Privatdocent of Cryptogamic Botany and Anatomy of Plants, Assistant of the Botanic Institutes and Gardens. Royal Hungarian University, Kolosvár.—The recent researches of Paul Reinsch in Erlangen have revealed the occurrence, on the surfaces of the coins of many nations, of different bacteria and two minute algæ (*Chroöcoccus monetarum* and *Pleurococcus monetarum*, P. Reinsch), living in a thin incrustation of organic detritus composed especially of starch-grains fibres, etc., deposited upon their surfaces during the course of long circulation. This thin incrustation renders the coins very suitable for this microvegetation, but the same phenomenon is exhibited by

paper money, and, indeed, by notes of clean, and, to the naked eye, unaltered surface.

I have scraped off some of these minute incrustations with hollowed-out scalpels and needles and divided them into fragments in distilled water that had been boiled shortly before, and, upon examining them with lenses of high power (R. T. Beck's 1-10th inch), have seen the various Schizomycetes distinctly.

I can now proceed to give a brief account of the results I have obtained from the investigation of the paper money. I have investigated the Hungarian bank and State-notes, recent and old (from the years 1848–49), also Russian rubel notes, and have found bacteria upon all of them, even upon the cleanest.

On the surface of all the paper money is always to be found the special bacterium of putrefaction, viz., *Bacterium Termo*, Dujardin.

In the thin incrustations on the paper money I ascertained the occurrence of starch-grains (especially those of wheat), linen and cot ton fibres and animal hairs, and, in this deposit upon the forint State-notes, the Blastomycete *Saccharomyces cerevisiæ* in full vegetation.

Various *Micrococci*, *Leptotriches* (many with club-shaped, swollen ends) and *Bacilli* are also the most frequent plants in the deposit of the paper money.

The two new species of algæ described by Paul Reinsch are very rare on paper money. The green *Pleurococcus* cells have been observed in some cases on 1- and 5-forint State-notes, and the bluish-green, minute *Chroöcoccus* on the border of the 5-forint State-notes.

The vegetation of the paper money is, according to my researches, composed of the following minute-plants:

(1.) *Micrococcus* (various forms); (2.) *Bacterium Termo;* (3.) *Bacillus* (various forms); (4.) *Leptothrix* (species?); (5.) *Saccharomyces cerevisæ;* (6.) *Chroöcoccus monetarum;* (7.) *Pleurococcus monetarum.* From a hygienic point of view, an investigation of the commonest household objects, and especially of books, etc., used by students, may not be superfluous.

Klausenburg, Hungary. A. K.

Recent Changes in Plant Nomenclature. — Dr. Gray, in his Manual, enumerates less than 400 monopetalous species from Caprifoliaceæ to Compositæ, inclusive. The just published Flora, Vol. i., Pt. ii., makes one hundred changes in the nomenclature of these plants. For the benefit of the numerous students and teachers using his Manual (considering that about one fourth the species are to receive different names), the names of the species thus affected are given below, together with the corresponding name in the Flora. *Aster* has been thoroughly revised, and the limits of the species, as well as their nomenclature, have been changed so much that reference to the Flora alone can adequately show in what the changes really consist. *Solidago* is revised as indicated in Studies of Aster and Solidago in the Older Herbaria. *Fedia* becomes *Valerianella; Diplopappus, Aster; Cirsium, Cnicus; Nabalus, Prenanthes; Mulgedium, Lactuca.* The numerous other changes can be seen in the following list:

Lonicera parviflora=L. glauca, Hill.; *Lonicera parviflora*, var.

Douglasii=*L. hirsuta*, Eaton; *Sambucus pubens*=*S. racemosa*, L.; *Viburnum nudum*, var. *cassinoides*=*V. cassinoides*, L.; *Diodia Virginica*=*Diodia Virginiana*, L.; *Fedia olitoria*=*Valerianella olitoria*, Poll.; *Fedia Fagopyrum*=*V. chenopodifolia*, DC.; *Fedia radiata*=*V. radiata*, Dufr.; *Fedia umbilicata*=*V. Woodsiana*, var. *umbilicata*, Gray; *Fedia patellaria*=*V. Woodsiana*, var. *patellaria*, Gray; *Liatris pilosa*=*L. spicata*, var. *montana*, Gray; *Liatris graminifolia*, Pursh, not Willd.; *Liatris odoratissima*=*Trilisia odoratissima*, Cass.; *Liatris paniculata*=*T. paniculata*, Cass.; *Eupatorium parviflorum*=*E. semiserratum*, DC.; *Eupatorium pubescens*=*E. rotundifolium*, var. *ovatum*, Torr.; *Conoclinium cœlestinum*, DC.=*Eupatorium cœlestinum*, L.; *Nardosmia palmata*=*Petasites palmata*, Gray; *Aster lævis*, var. *lævigatus*=*A. versicolor*, Willd.; *Aster Drummondii*, Lindl.=independent species; *Aster Tradescanti*, chiefly, and var. *fragilis*=*vimineus*, Lam.; *Aster miser*=*A. vimineus*, var. *foliolosus*, Gray; [*Aster miser*, Ait.=*A. Tradescanti*, L. partly]; *Aster simplex*=*A. paniculatus*, Lam.; *Aster carneus*=*A. salicifolius*, Ait., and *paniculatus*, Lam.; *Aster æstivus*, mainly=*A. junceus*, Ait.; *Aster longifolius*=*A. Novi-Belgii*, L.; *Aster puniceus*, var. *vimineus*=var. *lucidulus*, Gray; *Aster graminifolius*=*Erigeron hyssopifolius*, Michx.; *Aster flexuosus*=*A. tenuifolius*, L.; *Aster linifolius*=*A. subulatus*, Michx.; *Erigeron vernum*=*E. nudicaulis*, Michx.; *Diplopappus linariifolius*=*Aster linariifolius*, L.; *Diplopappus umbellatus*=*Aster umbellatus*, Mill.; *Diplopappus amygdalinus*=*Aster umbellatus*, var. *latifolius*, Gray; *Diplopappus cornifolius*=*Aster infirmus*, Michx.; *Boltonia glastifolia*=*B. asteroides*, L'Her.; *Solidago virgata*=*S. stricta*, Ait.; *Solidago stricta*=*S. uliginosa*, Nutt.; *Solidago Virga-aurea*, var. *humilis*=*S. humilis*, Pursh.; *Solidago thyrsoidea*=*S. macrophylla*, Pursh.; *Solidago elliptica*=*S. Elliotii*, Torr. & Gray; *Solidago arguta*=*S. juncea*, Ait.; *Solidago Muhlenbergii*=*S. arguta*, Ait.; *Solidago linoides*=*S. neglecta*, var. *linoides*, Gray; *Solidago altissima*=*S. rugosa*, Mill.; *Solidago serotina*=*S. serotina*, var. *gigantea*, Gray; *Solidago gigantea*=*S. serotina*, Ait.; *Pluchea fœtida*=*P. camphorata*, D C.; *Xanthium strumarium*, var.=*X. Canadense*, Mill; *X. strumarium*, var. *echinatum*=*X. Canadense*, var. *echinatum*, Gray; *Eclipta procumbens*=*E. alba*, Hasskarl.; *Helianthus cinereus*, var. *Sullivantii*=*H. doronicoides*, Lam.; *Helianthus microcephalus*=*H. parviflorus*, Bernh.; *Helianthus doronicoides*=*H. tuberosus*, L.; *Actinomeris helianthoides*=*Verbesina helianthoides*, Michx.; *Coreopsis involucrata*, Nutt.=independent species; *Verbesina Siegesbeckia*=*V. occidentalis*, Walt.; *Actinella scaposa*, var. *glabra*=*A. acaulis*, var. *glabra*, Gray; *Leptopoda brachypoda*=*Helenium nudiflorum*, Nutt.; *Maruta Cotula*=*Anthemis Cotula*, L.; *Leucanthemum vulgare*=*Chrysanthemum Leucanthemum*, L.; *Leucanthemum Parthenium*=*C. Parthenium*, Pers.; *Antennaria margaritacea*=*Anaphalis margaritacea*, Benth. & Hook; *Senecio Elliottii*=*S. aureus*, var. *obovatus*, Torr. & Gray; *Arnica mollis*=*A. Chamissonis*, Lees.; *Cnicus benedictus*=*Centaurea benedicta*, L.; *Cirsium lanceolatum*=*Cnicus lanceolatus* Hoffm; *Cirsium Pitcheri*=*Cnicus Pitcheri*, Torr.; *Cirsium undulatum*=*Cnicus undulatus*, Gray; *Cirsium discolor*=*Cnicus altissimus*, var. *discolor*, Gray; *Cirsium altissimum*=*Cnicus altissimus*, Willd.; *Cirsium Virginianum*=*Cnicus Virginianus*, Pursh.; *Cirsium muticum*=*Cnicus*

muticus, Pursh.; *Cirsium pumilum=Cnicus pumilus*, Torr.; *Cirsium horridulum=Cnicus horridulus*, Pursh.; *Cirsium arvense=Cnicus arvensis*, Hoffm.; *Lappa officinalis=Arctium Lappa*, L.; *Cynthia Virginica=Krigia amplexicaulis*, Nutt.; *Cynthia Dandelion=Krigia Dandelion*, Nutt.; *Hieracium scabrum*, in part=*H Marianum*, Willd.; *Nabalus albus=Prenanthes alba*, L.; *Nabalus albus*, var. *Serpentaria Prenanthes Serpentaria*, Pursh.; *Nabalus altissimus=Prenanthes altissima*, L.; *Nabalus Fraseri=Prenanthes Serpentaria*, Pursh.; *Nabalus Fraseri*, var. *integrifolius=P. Serpentaria*, var. *barbata*, Gray; *Nabalus nanus=Prenanthes Serpentaria*, var. *nana*, Gray; *Nabalus Bootii =Prenanthes Bootii*, Gray; *Nabalus virgatus=Prenanthes virgata*, Michx.; *Nabalus racemosus=Prenanthes racemosa*, Michx.; *Nabalus crepidineus=Prenanthes crepidinea*, Michx.; *Taraxacum Dens-leonis =T. officinale*, Weber; *Lactuca Canadensis*, var. *integrifolia=L. integrifolia*, Bigel.; *Lactuca Canadensis*, var. *sanguinea=L. hirsuta*, Muhl.; *Mulgedium pulchellum=Lactuca pulchella*, D C.; *Mulgedium acuminatum=Lactuca acuminata*, Gray; *Mulgedium Floridanum=L. Floridana*, Gaertn.; *Mulgedium leucophæum=L. leucophæa*.

A. F. Foerste.

Botanical Notes from Kansas.—As it is rarely that we see any communications from this State concerning our flora, in any of our botanical publications, I have thought a few lines in regard to it might be of interest. I made a trip during the first week of September out as far as Harper County, a little over three hundred miles southwest of Kansas City, Mo., traveling over the Southern Kansas R. R., which runs through the best counties in the State. Fine crops were noticed in every county through which I passed. The emigration to Southern Kansas this year is very large.

The following is a list of some of the plants collected on this trip: *Mentzelia ornata*, T. & G., Harper Co.; *Eryngium Leavenworthii*, T. & G., Allen Co., common; *Grindelia lanceolata*, Nutt., Southern Kansas; *Helianthus Maximiliani*, Schrader, common everywhere I traveled; *H. petiolaris*, Nutt., in Cowley Co. and west, common in Harper Co.; *Coreopsis cardaminifolia*, DC., Cowley and Harper Counties; *Thelesperma gracile*, Gray, Harper Co.; *Liatris punctata*, Hook., found here, and common southwest; *Hosackia Purshiana*, Benth., grows here and is common in Harper Co.; *Dalea laxiflora*, Pursh., Harper Co.; *Aster patens*, L., near Independence; *Dicliptera brachiata*, Spr., Cowley Co.; *Solanum elæagnifolium*, Cav., Cowley and Harper Counties; *Eriogonum tomentosum*, Mx., common in Harper Co.; *Atriplex hastata*, L., Sumner Co; *Frelichia Floridana*, Moq., Harper Co., common. Southwestern and Western Kansas are fine fields for botanists.

Paola, Kansas. J. H. Oyster.

Death of John Williamson.—We have to mourn the premature death of this gifted man, who passed away on the 17th of June. Mr. Williamson was born in Scotland in 1857, came to this country in 1866, and established himself in Louisville, Ky., at first in the business of wood-carving, and afterwards in a foundry for ornamental brass-work. An innate taste for decorative art here found oppor-

tunity for development, and an ardent love for nature gave truthful direction to his taste. In 1878 appeared in an unexpected quarter a little treatise upon the "Ferns of Kentucky," which surprised all fern lovers by the beauty and novel form of its illustrations. These were etchings by Mr. Williamson's own hand, transferred to the lithographic stone. This was soon after followed by the publication of a work illustrating the ferns of the region covered by Gray's Manual. In this work the plates were printed directly from the etchings, and the book appeared under the modest title of "Fern Etchings." This work not only supplied a real want in the world of science, but surprised and delighted all lovers of the art he was so successfully cultivating, and the best art-critics were loud in encomium. Encouraged by this, he was giving himself to the fuller cultivation of his powers in that direction, when his health failed, and he was taken away at the outset of a career which gave such promise of brilliancy, leaving behind him a widowed mother, to whom he had manifested a tender filial devotion. His friend Mr. Davenport has done justice to the sterling excellencies of his character in a touching sketch in a recent number of the *Botanical Gazette*.

J. H. R.

Botanical Notes.

The May-flower.—It has been suggested that the delicate and modest little flower which we call the May-flower should be adopted as the emblem of the loyalists, because it is in full bloom at the season of the year when they landed on these rocky shores. In connection with this it may not be out of place to inquire as to the use of the word May-flower or "May-blossom" in the past; and especially to ask what was the *May-flower of the loyalists?* Was their May-flower identical with our spring favorite, or was it some other plant, to us unknown, or if known, called by some other name.

Our May-flower has been named by botanists *Epigæa repens* or the plant that *creeps on the ground*—a name very appropriate to its habit of grow, thas it forms patches of foliage. . . . It belongs to the great family of the heaths, and its nearest allies in this country are the bear-berry, spicy wintergreen and tea-berry. They, like the May-flower have evergreen leaves, and differ in this respect from most of the American heaths.

But the purpose of these remarks is not so much to describe the May-flower and its habits as to inquire whether this flower of ours was the May-flower of the loyalists. The writer was very much surprised many years ago, on being told by an old lady who came here with the loyalists, that our plant (*Epigæa repens*) was *not* the May-flower. Among the wild flowers that were afterwards shown to her she at once recognized one as the true May-flower. This was the plant which is now called the spring beauty (*Claytonia Caroliniana*), a delicate little plant with two opposite leaves, which are not unlike an Indian's canoe-paddle in shape, and having a cluster of nodding pink flowers between the leaves. The short stem which the spring beauty annually sends up comes from a little brown tuber buried deep in the rich mould of the hardwood forest. The plant differs

from *our* May-flower in preferring a rich and moist soil, and its stem is soft and succulent like that of its ally the purslane (*Portulaca*), while the stem of *our* May-flower is strong and woody, and its leaves are thick and hard.

The family to which the lady belonged, who spoke of the spring beauty as the true May-flower, came from Connecticut; and it is easy to see why our May-flower was not theirs. In the region where they had lived before removing to St. John, the *Epigæa* would blossom in April, and the term "May-flower" would be inappropriate to it; hence some other blossom with them would have borne the name of "May-flower." The name and the associations connected with it were dear to those New England colonists; with what object more attractive could they have associated the ideas and the name than the delicate spring beauty—a plant which abounds in the rich woods covering the mountains and hills of Western New England and New York. To the loyalists of Connecticut, therefore, the word "May-flower" carried a different meaning from that which it bears with us.

And to the loyalists of New York and New Jersey, where the *Epigæa* was known as the trailing arbutus, the idea of "May-flower," as applied to this plant, was equally foreign. Their name for our May-flower, however, was not happily chosen, as the arbutus was one of those European heath plants which casts its leaves in the autumn, and in this resembles such American heath-plants as the leather-leaf (*Cassandra*) and the Lambkill (*Rhodora*). These cover the "barrens" with foliage and flower in June and July, but are bare and brown in the winter. As the term "trailing arbutus" was used in the Middle States for the *Epigæa* within a short time after the loyalists left there, it was probably current in their time as well. Whether the spring beauty was their May-flower or not, it is sufficiently clear that the *Epigæa* was not.

But to go one step further back in the history of the "May-flower." Washington Irving, in his "Knickerbocker's History of New York," describes in a very amusing way the helplessness of the Dutch Governors of New York in their attempt to oppose the colonizing tendencies of the New Englander. He describes the encroachment of the Yankees upon the territory of their Dutch neighbors on the northern shore of Long Island Sound, and they even swarmed over into Long Island, displacing the Dutch or occupying the country in advance of them. These Puritan farmers carried with them the tradition that their ancestors came over from England in the "May-flower." Many of them settled in Connecticut, and their descendants formed the bulk of the emigrants from that State whom we know under the name of loyalists. It is quite clear, however, that the May-flower for which the ship of the Pilgrim Fathers was named was not the "May-flower" of the loyalists, any more than the plant so designated by the latter is the May-flower of the maritime Canadians, for neither the *Epigæa repens* nor the spring beauty were known to Europeans before the discovery of America. They are both natives of this continent and are unknown in the old. The May-flower of the Pilgrims must, therefore, have been some other plant—perhaps the hawthorn (*Cratægus Oxycantha*), which appears to be alluded to by Mickle in the following lines:—

"By this stream and the *May blossomed* thorn
That first heard his love tale and his vows."

And by Spencer in the following:

"To gather *May busket* and smelling brere
And home they haste the postes to dight."

And in Chaucer there is the following line:

"And fresher than the *May* with flowers newe."

The hawthorn still bears in England the name of "The May," and there can be little doubt that its fragrant blossoms suggested the name borne by the pioneer ship of the Plymouth colony.

As the location of the Sacred Mount—the point of dispersion of a primitive people—was transferred to the migrating Indo-European nations from one country to another, in the Old World, so the Saxon emigrants transferred the name of "May-flower" to a new species of plant, as they lost their familiarity with the old. To us, living in a region where *Epigæa* abounds, and blossoms in May, it very appropriately bears the name of May-flower, not only on account of its beauty and its fragrant flowers, but because it blooms in the spring. It is rightly chosen by the descendants of the loyalists as a fitting emblem of those who, on this day 100 years ago, first set foot on the shores of New Brunswick. Its home is in that region of the North American continent which extends from the Atlantic coast of Nova Scotia, through New Brunswick and Maine, to Eastern Ontario, Lake Superior and the rocky wilds of the northwest. In Ontario and the Maritime Provinces of Canada is the home of the loyalists, and when the first detachment of these people landed on the rocky shores of St. John's harbor in the spring of 1783, there can be no doubt that they found the May-flower (*Epigæa*) blooming around them. In its leaves, fresh and green from beneath the winter snow, they would have seen an emblem of their own preservation through adversity in the past, and in its modest and fragrant blossom an omen of content and prosperity in the future.

In conclusion, it may be added that our reflections upon the May-flower lead to the following result:—

The May-flower of the Pilgrims was not the May-flower of all the loyalists.

The May-flower of the loyalists was not the May-flower of the maritime Canadians.

The May-flower of certain of the loyalists was the spring beauty.

The May-flower of the maritime Canadians may very fittingly be dedicated to the loyalists.

Or, to consider the matter from a chronological standpoint, it may be said that 260 years ago the hawthorn was the May-flower. One hundred years ago the spring beauty was to some loyalists the May-flower. *Now* the *Epigæa* is to the descendants of the loyalists the May-flower.—*G. E. Mather, in Canadian Sci. Monthly.*

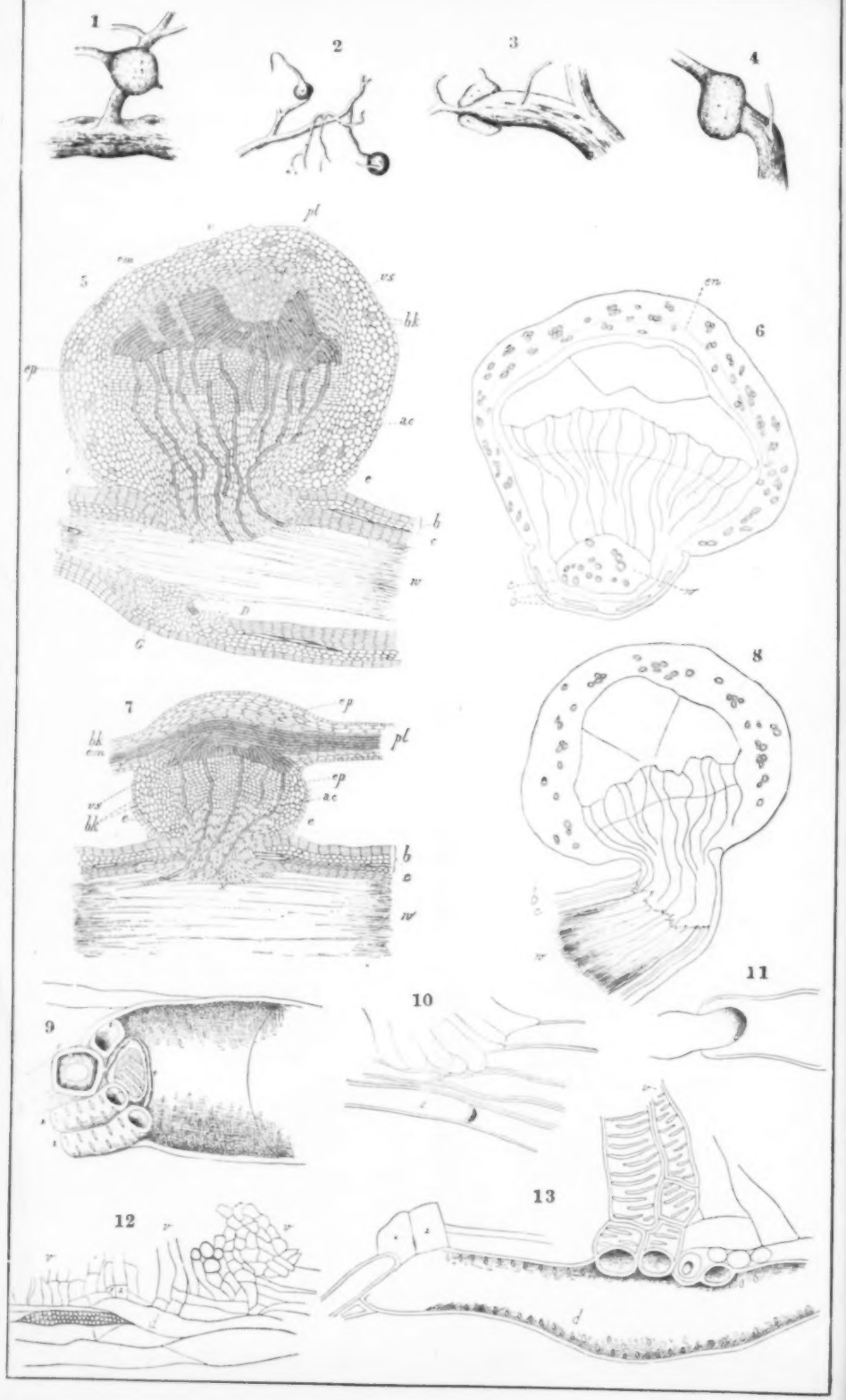
The Continuity of Protoplasm in plants is still attracting considerable attention in botanical circles. An interesting article in *Nature* (June 16, p. 182) gives a *resumé* of the history of the subject from the year 1837. Herr Russow, who maintains that in all plants during their entire life the whole of the protoplasm is continuous, says the protoplasmic threads are seen well in *Rhamnus*, *Fraxi-*

nus, Humulus, Gentiana cruciata and in the bark of *Prunus, Quercus,* etc. Threads, however, which contain no granules, but are transparent and homogeneous, are with difficulty rendered visible. His method of examination is to lay the sections to be examined in a solution of 0.2 per cent. of iodine and 1.64 per cent. of potassium iodide in concentrated sulphuric acid. After removal, the sections are repeatedly washed and then stained with aniline blue; in some cases they are previously stained with picric acid. Mr. Gardiner, however, considers that the sulphuric acid method is unsatisfactory and that the method of swelling with chloro-iodide of zinc and of staining with picric-Hoffman blue is in every way more advantageous, since little alteration of structure takes place and the staining with blue is limited to the protoplasm.

Chemical Constituents of Plants—Herr M. Ballo contributes an important paper on this subject to the Proceedings of the German Chemical Society. He thinks that oxalic acid has a much more important function in vegetable physiology than is generally supposed, carbohydrates being formed from the reduction of this and other vegetable acids rather than by direct synthesis from carbonic acid and water. Tartaric acid, on the other hand, is a product either of the oxidation of carbohydrates or of the reduction of oxalic acid, as is also the glycolic acid which occurs in unripe grapes and in the the leaves of the wild vine. As regards all other products of oxidation, the less the amount of oxidation the more complicated is the product and the more closely related to the original substance; while, when oxidation is carried on further, we get the original substances by which the plant is nourished. The vegetable acids are the most common products of oxidation in the plant. A portion of the oxalic acid is used in the decomposition of calcium sulphate, the rest as the raw material for the production of glycolic, tartaric, malic and succinic acids.

If formic acid is heated with nitric acid it is oxidized into carbonic acid and water, the nitric acid being reduced to nitrous oxide; but at the commencement of the process oxalic acid is formed, and the author believes that this process also takes place in nature, and that this is one of the reasons why nitrates are so valuable to the growing plant. In the living plant a portion of the nitrates is used in the production of ammonia and other substances nearly related to it, and another in the conversion of amide compounds into alcohol compounds. The greater part is reduced to the state of nitrous oxide, and from this nitric acid is again formed through the agency of oxygen and water. Hence a small quantity of nitrates can bring about the formation of a large quantity of oxalates.

Electric currents exist without doubt in the living plant, and it is possible that in some cases these may be converted into chemical work consisting in the decomposition not merely of water but also of salts. The products of decomposition of these salts may cause the formation of metal derivatives at the negative pole, of derivatives with negative radicals at the positive pole. Elsewhere, these substances may again combine with one another and the same process be then again repeated. Hence the comparatively small quantity of inorganic salts found in plants.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Notes on the Haustoria of some N. A. Parasitic Phanerogams.*

By JOSEPH SCHRENK.

(Plate XLVI.)

GERARDIA QUERCIFOLIA, Pursh.—The parasitism of *Gerardia* seems to have been first pointed out by J. Stauffer, who, in a curious little pamphlet of two pages, printed by the author in 1850, mentions the parasitic attachments of *Gerardia flava*, *quercifolia*, *pedicularia* and *tenuifolia*.† On two accompanying plates portions of specimens of these four species are figured. The character of these illustrations may be judged of by a reproduction of one of them in Gray's Structural Botany, p. 38. Neither text nor figures contain any information about the interior structure of the haustoria, nor was I able to discover any literature referring to this subject anywhere else.

The figures on Plate xlvi. (with one exception) were drawn from the haustoria of *Gerardia quercifolia* attached to the roots of *Corylus rostrata*, Ait., gathered in New Hampshire, in the month of August, and on them the following description is mainly based. Besides, I examined the haustoria of *Gerardia flava*, L., *pedicularia*, L., *tenuifolia*, Vahl., *purpurea*, L., and *maritima*, Raf. The two latter species, to my knowledge, have not yet been reported as parasitic.

The haustoria of *Gerardia* appear as lateral rounded excrescences which are scattered irregularly along the branches of the root, wherever there is a chance for them to obtain suitable nourishment: they very frequently attach themselves to the root of the *Gerardia* itself. The largest I found are about $6^{mm.}$ in length, while the smallest consist simply of a few layers of cells raised above the surface of the root. We either find several, often many, haustoria, more or less distant from one another, growing from the same branch of the *Gerardia* root, which keeps on growing, eventually producing more haustoria (Fig. 7; at *cm* we see the continuation of the root); or the rootlet, after having produced a haustorium, shrinks into an insignificant appendage (Fig. 1), or disappears altogether, so that the haustorium appears terminal (Figs. 2, 3, 4).

*Cf. BULLETIN, Vol. x., No. 4.

†When I sent the note referring to the parasitism of *Gerardia tenuifolia* to the BULLETIN, in December 1883, I had not yet seen this pamphlet; a copy of it was found in the library of the Torrey Herbarium by Dr. N. L. Britton, who drew my attention to it, and thereby enables me to give the credit of having discovered the parasitism of *G. tenuifolia* to Mr. Stauffer. In this pamphlet *Comandra umbellata* also is briefly described, and two accompanying plates, lithographed and printed by the author, give a good representation of the entire plant above ground, and a fair one of its roots.

At the earliest stages of their development which I examined, the haustoria form slight excrescences from the cortical portion of the *Gerardia* root, in such a way that the epidermis forms an unbroken covering of both root and haustorium. On young haustoria I noticed some papillose superficial cells which looked exactly like short root-hairs, but their principal function evidently is to take hold of some contiguous foster-root. The youngest haustoria do not contain any vascular tissue, but soon there appear in the axial portion single threads of reticulated vessels connecting the apex of the haustorium with the fibro-vascular tissue of its mother-root. At the same time the haustorium increases in all its parts and finally appears as figured on the plate.

As I called the haustorium an outgrowth of the root, and as the tissues of the latter are continuous with those of the former, I will, in the first place, give a brief description of the root of our *Gerardia*.

In the centre of the root there is a fibro-vascular cylinder; its diameter is usually equal to about one-half the diameter of the entire root. This cylinder contains very wide reticulated vessels and thick-walled wood-cells; it is surrounded by a narrow zone of cambium beyond which we find large parenchymatous cells with many intercellular spaces. Irregularly scattered in the parenchyma we see numerous sclerenchyma cells, singly or in groups from 2 to 6, mostly of prismatic shape; their walls are exceedingly thick and pierced by branching canals. The zone of parenchyma around the central wood cylinder is divided about midways by a layer of closely arranged cells. This layer seems to be a true endodermis; its cells are very narrow compared to the surrounding parenchyma cells; the partitions separating them are strictly radial and frequently undulating, and the cell-walls resist the action of sulphuric and even of chromic acid. Inside of this ring the starch granules in the parenchyma cells are much smaller than in those outside of it, where they are quite large.

At the circumference of the root there is a single layer of epidermoidal* cells the outside walls of which are thickened and even more resistant against the action of the reagents mentioned above than are the walls of the endodermis. The surface view of the root shows that these cells are arranged in oval, frequently elongated hexagonal plates or patches. The middle portion of such a group is formed of rows of two or three cells each; the cells are separated by radial (and vertical) partitions which are still more wavy than those found in the endodermis.

At first I was inclined to consider this epidermoidal layer as the true epidermis, and to explain the absence of root-hairs by the parasitic nature of the plant; but, on closer examination, I soon found that the supposed epidermis was covered with a continuous layer of very long, exceedingly thin-walled, empty cells, which, on the cross-section, show quite an irregular outline (Figs. 5 and 7, *e*). Owing to the tenderness of their membranes it is not easy to obtain transverse sections that will show these cells completely encircling the root, and

* This term is used by v. Höhnel, Olivier and others to designate a layer of cells close to the epidermis, that resembles in most respects the endodermis.

it is still more difficult to prepare perfect longitudinal sections. However, I never failed to see this epidermis, as I must call it, on thin, *i. e.* young portions of the *Gerardia* root, while on older ones I could, at best, make out a few shreds only. I must therefore suppose that the epidermis is soon cast off. I am not prepared to assert that these epidermal cells perform the functions pertaining to root-hairs, but, considering the thinness of their membranes, which do not seem to be cuticularized, and their peculiar inflated form, I do not see what should prevent them from absorbing the water from the soil in case the plant needed it.

Referring to this description of the root, the structure of the haustorium itself will be more easily understood. With *Gerardia*, the body of the root from which the haustorium grows, contributes a much greater share to the bulk of the haustorium than with *Comandra*. We can see from Figs. 5 and 7 that a considerable portion of the upper half of the haustorium really belongs to the root proper. In Fig. 5, representing a longitudinal section of a hazel-root that bears a haustorium in the manner illustrated by Fig. 3, the vascular cells of the *Gerardia* root, *pl*, appear cut across, for it had grown at right angles with the foster-root. In Fig. 7 the vessels of the *Gerardia* root, *pl*, are viewed longitudinally, *Gerardia* and hazel-roots lying in the same plane.

The epidermoidal layer of the haustorium is continuous with that of its root (Figs 5 and 7, *ep*), and the epidermis, *e*, is also met with on the haustorium. It is found especially well preserved in the angles at which the haustorium and the foster-root meet (Figs. 5 and 7, *e*). In and near these places the epidermis-cells have so multiplied as to form several irregular layers; no doubt, they help the *Gerardia* to get a better hold of its host.

The portion of the haustorium-bark underneath the epidermis, *bk*, is likewise a continuation of the root-bark. The parenchyma cells near the epidermis are larger than those nearer the centre; the former contain much larger starch-grains. The endodermis of the root is also continued in the upper part of the haustorium ; in Fig. 6, it is indicated by a dotted line, *en*. The sclerenchyma-cells are of the same structure and similarly arranged in both root and haustorium ; they are, as a rule, more numerous in old haustoria. The cortical portion does not penetrate into the foster-root, but ends at its surface.

From the central wood-cylinder of the root very numerous vessels, surrounded by a zone of cambium, spread downward like an umbrella, but in a solid mass, Figs. 5 and 7, *vs*. Before they reach the middle of the haustorium most of them end abruptly, anastomosing, however, by means of short connecting vessels. Many of these vessels continue their course, singly, through the lower part of the haustorium to its apex, until they reach the wood tissue of the foster-root (Figs. 5, 6, 7 and 8). They consist of comparatively short links, the ends of which are laterally connected, and are transformed into continuous passages in the usual manner, by the absorption of their septa.

These vascular fibres are accompanied, in their lower course, with elongated, active cells, *ac*, which constitute the meristematic tissue

within which the growth of the apex takes place. In the central part of every haustorium, just below the solid mass of descending vessels, there is a layer of considerable thickness which, except at its centre, is formed of regular rows of oblong cells that are flattened contrary to the vertical axis ot the haustorium. The centre of this layer consists of rounded, irregularly arranged cells (Figs. 5 and 7). All the cells of this central portion contain a turbid, granular protoplasma, so that after staining with carmine they become quite conspicuous.

The contact of the tissues of the parasite with those of the foster-root is similar to that which we observed in *Comandra*. I satisfied myself that there is a perfectly open communication between them. The meristematic, active cells enter the vessels of the foster-root bodily after the walls of the latter have been partly absorbed, Figs. 10 and 11. Some vessels are formed in the haustorium, at the side of a vessel of the foster-root, and then the side-wall of the latter and the end walls of the former are absorbed, Fig. 13; or they meet end to end, and then they simply form one passage after the absorption of the end-walls, Fig. 9.

But more interesting and more important than all these facts I consider the following observation that I wish to record on this occasion.

In ever so many haustoria of *G. quercifolia* and, in a still more exquisite manner, of *G. flava*, I found almost all their vascular cells connected with those of the foster-root in such a way, that communication was open between the parasite and the *stem* of the foster-plant, while communication between parasite and peripheral ends of the foster-*root* was entirely cut off. In Fig. 5 the right-hand side of the foster-root, at *w*, if not cut off, would lead to the main root, and that to the stem. We observe that the tissues at the left, toward the root end were absorbed and replaced by the apex of the haustorium and that none of the entering vascular fibres turns that way. In Fig. 7 the *left* hand side points towards the stem. The process begun in these two cases has been completed in the one illustrated by Fig. 8. The apex of the haustorium gradually worked its way deeper and deeper into the hazel-root, while its tissues kept turning steadily in one direction: toward the stem, away from the root-end, until finally the latter was cut off completely and the haustorium took its place. The progress of this process may be seen in its various stages by examining some typical forms of the *Gerardia* haustorium, as illustrated by Figs. 1, 3, 2 and 4.

I have some slides with sections taken from *G. flava* which show the tendency of the apex to turn away from the root-ends in a remarkably clear manner. That portion of the apex which would correspond to the portion lying to the right of the point *x*, in Fig. 7, or to the left of *x* in Fig. 5 (*i. e.* toward the root-end), is *separated* from the tissues of the foster-plant, for the outermost cells of this part of the haustorium have their *outer* walls lignified, as shown by the indol and other reactions. At the same time, the adjacent cells of the foster-root are found to be in a state of partial decomposition, while on the opposite side the connection between parasite and host is perfect, as shown by Figs. 10 and 11 which were drawn from one of these slides.

I said above that haustoria are very frequently found attached to the roots of *Gerardia* itself. Such haustoria have either the shape of those already described (Figs. 1–4), or they are mere cylindrical branches growing at right angles *from* some *Gerardia* rootlet *into* another contiguous one. But, instead of single threads of vascular cells as described above, all these haustoria have solid, massive cylinders of vessels connecting the root *from* which, with the root *on* which they grow. In these haustoria I could not detect the remarkable tendency of the apical tissues to meet the descending sap-current of the foster-plant, the vessels are generally inserted at right angles with the wood cylinder of the *Gerardia* root.

In some *Gerardia* rootlets infested with haustoria I found the vessels in the immediate vicinity of the haustorium apex filled with those hernioid protrusions which were observed by some histologists* growing in vessels surrounded by very active cells. The walls of these active cells will bulge out through the pits of a vessel into its cavity; then they will grow considerably, forming globular cells, and will eventually close up the vessel entirely. In the sections that I have examined the walls of these hernioid cells seem to be lignified; at least, they appear of the same color as the vessels enclosing them after staining the sections with alum carmine and aniline green.

If I had found these "puzzling"† hernioid protrusions near all, or at least near very many of the haustoria examined, I should not hesitate to consider them as a contrivance to defend the *Gerardia* against the senseless depredations of its own haustoria.

I abstain, for the present, from drawing the conclusions in reference to the nature of parasitism in general, which are most forcibly suggested by the above premises.‡ Besides, if these observations should prove correct, they might contribute, to a certain extent, to the solution of another much discussed, and still undecided,§ physiological question—the question about the functions which the tracheary tissues perform in the transmission of the various fluids necessary to the life of plants.

We have seen that in the parasites examined thus far the *channels* or cavities of the vessels are in close, open connection with the cell-cavities of the foster-root. Shall we still assume that it is only *air* which passes within these united channels? And must we still suppose that the water in plants travels within the *substance* of the walls of these vessels, and not within their cavities?

Hoboken, August, 1884.

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* De Bary, *Vergleichende Anatomie*, p. 594 ("Thyllen"); J. C. Arthur in Ch. E. Bessey, Botany, p. 30.

†Bessey, l. c.

‡ *E. g.* it is very doubtful whether the following assertion, found in Sachs (Lehrbuch, 4th ed., p. 690, foot-note) will hold good: "Parasites containing much chlorophyl, like the Loranthaceæ, are able themselves to assimilate, consequently they need to take only water and mineral substances from their foster-plants."

§ Haberlandt, Physiologische Pflanzenanatomie (1884), p. 209: "The physiological nature of the vessels and tracheids has been discussed very frequently; still this question has not yet been definitively solved."

EXPLANATION OF PLATE XLVI.—Figs. 1, 2, 3, 4. Haustoria on hazel-root about x 8, (see text). Fig. 5. Longitudinal section of haustorium and hazel-root of the same form and arrangement as those of Fig. 3. *e*, epidermis; *ep*, epidermoidal layer; *bk*, bark (parenchyma and sclerenchyma cells); *cm*, cambium; *pl*, central wood cylinder of *Gerardia*-root cut across; *ac*, meristematic tissue; *b*, epidermis and bark of hazel-root; *c*, cambium; *w*, wood tissue; *G*, portion of the haustorial apex that has worked its way around the wood-cylinder of the foster-root to its lower side (*cf.* Fig. 3); *D*, large pitted duct of Corylus with entering vessels of *Gerardia*; x 45.—Fig. 6. Cross-section of both *Corylus* and *Gerardia*-roots. As the tissues of the haustorium appear in the same way as in Fig. 5, the outlines only are given. *en*, endodermis; *c*, *b*, *w*, same as in Fig. 5, x 25.—Fig. 7. Longitudinal section of both *Corylus* and *Gerardia*-roots. Letters as in Fig. 5, x 45.—Fig. 8. Section of a haustorium occupying the end of a rootlet, as illustrated in Fig. 2, x 45.—Fig. 9. The duct D, Fig. 5, magnified x460. 1, large vessel of *Gerardia* cut across, showing perforated septum; 2, 3, 4, 5, smaller vessels communicating with 1 and opening into the large *Corylus*-duct; the vessel 4 shows remnants of its absorbed end wall and (below the rim) of a septum, also the scalariform thickening of its farther wall.—Figs. 10 and 11. Wood-cells of an unknown root attacked and entered by some haustorium cells of *Gerardia flava*, x 500.—Fig. 12. Tangential section of hazel-root with medullary ray cut across, and with large duct *d*; *v*, cells of haustorium, x 135.—Fig. 13. Duct *d*, of Fig. 12, magnified x 460, to show the vessels of *Gerardia*, *v*, opening into the duct, and the cells 1 and 2 disintegrating its end wall.

All the powers given above refer to the original drawings, which, in the plate, appear reduced to one-half their size.

Kansas Fungi.*

By J. B. ELLIS and W. A. KELLERMAN.

ÆCIDIUM ÆSCULI.—Hypophyllous, on pale yellowish, slightly thickened spots, 4–6^{mm} in diameter. Æcidia orange-yeilow, 30–75 on each spot, generally with a vacant space in the centre, hemispheric and closed at first, about 200μ in diameter, at length opening above and becoming short cylindric, with an irregularly lacerated margin; spores orange-colored, irregularly globose (19–25μ) with coarse granular contents; the component cells of the æcidia subhexagonal or oblong, and faintly striate, the striæ extending more or less perfectly entirely across.

On leaves of *Æsculus glabra*. May. No. 526.

ÆCIDIUM VERBENICOLA.—Æcidia hypophyllous, clustered, 3–35 together, 200–250μ in diameter, orange-red within, covered outside with a granular, semitransparent coat like grains of sugar; margin of æcidia white, recurved and sublacerate-dentate; component cells subhexagonal (19–25μ), or elongated (30–35x20–25μ), surface marked with flexuous ridges and tubercles; spores globose, elongated or subangular by compression, 19–25μ, orange. The corresponding spots on the upper surface of the leaves are at first pale yellow but become purplish black.

On leaves of *Verbena urticifolia* (No. 532) and *V. stricta* (No. 549.) June. Possibly not distinct from *Æc. Verbenæ*, Speg., but differs with constantly clustered æcidia with *recurved* margin, and in not being hemispheric at first.

ÆCIDIUM CEANOTHI.—Æcidia hemispheric, closed at first, but

*The species here described were collected by Dr. W. A. Kellerman in the vicinity of Manhattan, Kansas, from May to September, 1884.

finally open, with an erect, subentire margin, .33–.5$^{mm.}$ in diameter, whitening out; component cells with a more or less distinct striate margin; spores subglobose, about 20μ in diameter, orange. The portion of the leaf occupied by the fungus, generally a small marginal area .75–.5$^{cm.}$ in diameter, is slightly thickened.

PHYLLOSTICTA CORNUTI.—Perithecia minute (70μ), black, thickly scattered on indistinct brownish spots (2–3$^{mm.}$) nearly round or limited by the veinlets of the leaf, subangular and of irregular outline and more or less confluent; spores oblong-cylindric, about 3x1μ.

On withered or dead leaves of *Asclepias Cornuti*. Aug. No. 620.

PHYLLOSTICTA VERBASCICOLA.—On large, brown, rather indefinitely limited spots, 1.5–1$^{cm.}$ across, or, by confluence, 2–4$^{cm.}$, occupying large irregular areas of the leaf. Perithecia buried in the substance of the leaf, 100–150μ in diameter and filled with abundant subhyaline or brownish tinted, oblong-elliptical spores, mostly 3.5–4x1.5–2μ, with a few darker and larger.

On leaves of *Verbascum Thapsus*. July. No. 587.

P. Verbasci, Sacc., is on small bleached spots and has spores 6x3μ, slightly constricted in the middle.

SEPTORIA LEPTOSTACHYA.—Perithecia amphigenous, punctiform minute, black, scattered on pale brown spots 2–4$^{mm.}$ in diameter, limited in part by the veinlets of the leaf, and without any very distinct raised border; spores filiform, slightly undulate-curved (nucleate ?) 20–22μ by about 1μ, or rather less.

On leaves of *Phryma Leptostachya*. Ohio. June, 1883. No. 344.

SEPTORIA CEPHALANTHI.—On round, red-brown spots (1.5–3$^{mm.}$) with a narrow, slightly raised border. Perithecia minute (130–120μ) mostly collected in a cluster in the centre of the spots; spores abundant, fusiform, brownish, continuous, nearly straight, 12–20x1μ. This can hardly be *S. verrucæformis*, B. & C., which is on branches of *Cephalanthus*.

On leaves of *C. occidentalis*. Aug. No. 602.

SEPTORIA STENOSIPHONIS.—Spots red-brown 1-2$^{mm.}$, or, by confluence, 2–4$^{mm.}$ across, either remaining brown or whitening out in the centre, the whitened part being surrounded by an indistinct narrow border, which is included in the limits of the brown spot; perithecia visible on both sides of the leaf, mostly collected in the centre of the spots, brownish black, subglobose (90μ); spores filiform, yellowish or nearly hyaline, but slightly curved, 18–30x1μ.

On *Stenosiphon virgatus*. July. No. 578.

Closely allied to *S. Œnotheræ*, West., but spots smaller, spores shorter and narrower and perithecia less numerous.

ISARIA XYLARIOIDES.—Stems fasciculate, about 1$^{cm.}$ high and 1$^{mm.}$ thick, brown, dusted with yellow powder below and bearing above a white, oblong head, composed of loosely branching hyphæ bearing abundant globose or ovate hyaline conidia, 2–2.5$^{mm.}$ in diameter. The whole somewhat resembles an imperfectly developed *Xylaria*, which perhaps it is.

On dead wood. June. No. 554. Sent also from Bethlehem, Pa., August, 1884, by Mr. E. A. Rau.

CERCOSPORA ISANTHI.—On round (1$^{mm.}$) white spots, with a nar-

row raised border, hyphæ tufted (25–30x4μ), crooked and subdentate above, continuous, brown; conidia clavate-cylindric, multiseptate, 75–100x3–4μ. The spots are at first purplish, with a purple shaded border but soon whiten out.

On leaves of *Isanthus*. Manhattan, Ks. Aug. No. 610.

CERCOSPORA TUBEROSA.—Hypophyllous, on spots (.75–.5$^{cm.}$) at first gray and imperfectly defined, but at length dirty brown and of irregular outline, angular, elongated and partly limited by the veinlets of the leaf, hyphæ arising from a small tubercular base, nearly straight and more or less toothed above, septate, brown, 35–45x4μ; conidia subcylindric, slightly tapering downwards, subfuscous, 5–10-septate, 80–110x3.5–4μ.

The spots are darker and more distinctly defined on the upper side of the leaf. This differs from the preceding chiefly in the character of the spots.

On leaves of *Apios tuberosa*. No. 613.

CERCOSPORA OCULATA.—Mostly epiphyllous, on dirty brown spots (.25–75$^{cm.}$), with a definite, slightly raised, narrow, darker border; hyphæ cæspitose, short (25–30x4μ) obtuse, simple, brown, continuous, entire or slightly denticulate and obtuse above; conidia at first oblong and 1-septate, 20–30μ long, at length attenuated below and becoming 30–60x3–4μ and faintly 3-septate.

The spots are often concentrically wrinkled and sometimes confluent, forming patches 2–3$^{cm.}$ across. This differs from *C. Vernoniæ*, E. & K., in the different character of the spots, as well as in its shorter and less distinctly septate conidia.

On leaves of *Vernonia Baldwinia*. July. No. 574.

CEROCOSPORA TEUCRII.—Epiphyllous, on brown (mostly 1–2$^{mm.}$) spots which soon become dirty white, with dark or purple shaded border; hyphæ tufted, brown, crooked and sub-denticulate above, 75–120x3–4μ, faintly septate.

On leaves of *Teucrium Canadense*. Aug. No. 457.

Notes on Corema Conradii.

In July, 1879 I found *Corema Conradii* growing quite abundantly at Grand Lake, Nova Scotia. It was limited, however, to a bare promontory on the eastern shore of the lake, and was associated with *Myrica Gale*.

ELIZABETH G. KNIGHT.

——— To Mr. Redfield's interesting and comprehensive list of localities of *Corema Conradii*, in the last number of the BULLETIN, I have one addition to make. On the summit of Blue Mountain, just back of Camden, Maine, perhaps eight hundred feet in height, and within a half hour's climb from the village, I have found several large patches of this interesting species. The dates of flowering are noted in my herbarium as May 18th, 1859, and May 2nd, 1860.

Washington, D. C. J. W. CHICKERING.

——— Prof. Fowler, of Kingston, Ontario, has found *Corema Conradii* abundant in a sphagnous bog near St. John, New Brunswick. I have seen it also at Aylesford, Nova Scotia, growing on a sandy plain

among scattered pines. This station was visited by Prof. Macoun and Dr. Burgess in 1883, and described in a late number of the *Botanical Gazette*. It is not far from Dr. Howe's station at Wilmot, in the adjoining county. Other localities will probably be found in the western part of Nova Scotia.

Presque Isle, Me. J. VROOM.

——— With regard to Mr. Redfield's most interesting paper on *Corema*, I would note that there seems to be no doubt that Mr. S. W. Conrad did collect the plant at "Pemberton's Mills, about twelve miles from Burlington, N. J.," for a specimen so ticketed is in the Torrey Herbarium.

N. L. BRITTON.

——— Besides the localities of *Corema Conradii*, Torrey, recorded by Mr. Redfield in the September number of the BULLETIN, I can state that the plant grows in great abundance on the island of Nantucket, Mass., where I have known it for some twenty years. There are acres of it, as in Plymouth, occupying the ground to the exclusion of almost everything else. The plants are large, with their tops rounded, so that the surface of the bushes looks like an assemblage of green mounds of a conspicuous and pleasing regularity. The tops are two and three feet in diameter, all green and flourishing, but, underneath, the branches, large and small, are leafless and look very old.

The plants bloom profusely the last of April or early in May, and the fruit when ripe falls off and covers the ground. From the activity of the ants amongst the little grains I have suspected that they made some use of them.

The locality most easily reached is on the *old* 'Sconset road, from one to two miles from the edge of the town.

Springfield, Mass. MARIA L. OWEN.

Aromatic Leaves in Quercus rubra.—One warm morning early in August last, while exploring a grove surrounded on all sides by saltmarshes, in Sea View (Marshfield), my attention was attracted by a strong, almost hot, perfume. My two companions, coming to the spot a moment afterwards, noticed it also.

A search by all three failed to reveal anything beneath the leaves on the ground or above them more fragrant than golden-rod, and the few stalks of sweet golden-rod grew beyond the limits of this peculiar fragrance.

The impression produced on our minds was so strong that about a fortnight afterwards two of us paid another visit to the marsh expressly to investigate the odor. I fancied that it might prove to be a hidden plant of *Apios tuberosa*, as I had, in the meantime, seen some in bloom, though not within a couple of miles of this place. Finding, after a thorough search, that there was no *Apios tuberosa* or anything else to account for the perfume, and that I lost it when more than six or eight feet distant from a certain oak-tree, it occurred to me to smell of the oak-leaves. I found that the fragrance proceeded from them. I afterwards found another sweet-scented oak

on high land, not near the water, and a mile from the first. On a third visit to the marsh, late on a cool afternoon, I found still another specimen, though not very near the first.

All the trees seem to be the common red oak (*Quercus rubra*); those in the marsh are not more than ten or twelve feet high, and are bushes in shape, with branches to the ground. The upland specimen is a tree twenty-five to thirty feet high. None of the oak-trees about them has any odor whatever, and, while the latter seem to be comparatively free from the attacks of insects, the former are so eaten that it is difficult to find perfect leaves. The only exceptions to this are the young red leaves at the ends of the branches; they are all perfect and have no odor until dried for twenty-four hours, when they develop it as strongly as the mature green leaves. All lose their odor when pressed, but retain it for a week or more when simply dried. The leaves of the upland tree were sweet when last seen, September 22nd. The others were probably so too, but I did not see them. I have examined all the oak-trees I have met with since finding the above, but have discovered no more sweet ones. If one is not attracted by the strong arbutus perfume when passing near the tree, it seems to be useless to examine it further.

These trees appear to reverse the rule with sweet-leaved plants, which generally have to be crushed or dried to develop their full fragrance. For instance, one can walk through a plantation of bayberry and hardly perceive any odor, though when crushed or dried the leaves are very sweet and finally acquire the exact smell of tea. These oak-leaves, on the contrary, attract the attention of the passer-by, are not improved by crushing, and, with the exception of the young leaves mentioned, do not gain more fragrance in drying.

Boston, Oct. 22nd, 1884. BELL F. HAPGOOD.

Subularia aquatica.—In September, 1882, I found one specimen of this rare little plant on the gravelly margin of Echo Lake, Franconia, and quite out of water. I made a note of it in the BULLETIN for March '83. I afterwards received several letters from botanists in regard to the plant, and was told that no record had been printed of its being found at Echo Lake since Tuckerman's discovery in 1844. In September '83 I again visited the station, and was so fortunate as to find several specimens in the same locality, all out of water and quite small. My information concerning the plant was derived from Gray's Manual, which gives its habitat "margin of lakes." I did not therefore search for it under water, and other botanists who visited the place made the same mistake. But this year I, with others, have made further investigations, with satisfactory results. It is found in great quantities on the gravelly bottom of the lake, in from one to four feet of water, and probably at a greater depth. In this situation it is much more luxuriant, sometimes fully 9 inches in height, and grows in thick, close mats, twenty to thirty feet in extent. On consulting Tuckerman's original article (*Silliman's Journal*, 2d series, vi., 1848) I find that he there speaks of the *Subularia* as submersed, "growing abundantly in about a foot of water." In Gray's Genera, 1848, it is described as "growing on the

gravelly margins of lakes and pools where it is ordinarily covered with water. Gray's Manual gives June and July as its flowering season, but I have never seen it even in bud before August, and I do not think it is in pod (and therefore in the best state for examination and identification) before September.

ANNIE TRUMBULL SLOSSON.

Immediate Influence of Crossing or Hybridizing on Fruits and Seeds.—Much writing, though few experiments, has been offered lately on this subject. Anxious to go, myself, over experiments recorded in the early part of the century in relation to sterility in hybrid Verbascums, I crossed *Verbascum Blattaria* with *V. Thapsus* the past summer. I need not go over the precautions taken to prevent the use of self pollen—every one of experience knows how to make these precautions absolutely certain in their results. Again, I may note that the seeds of these two species are very distinct as seen under a lens. *Thapsus* has gray seeds, which taper as if they were the ends of corn-cobs—those of *Blattaria* are dark brown, and in form as if they came from the middle portion of an ear of corn. The hybrid seed-vessel and the hybrid seeds were exactly those of its female parent, *V. Blattaria*. I have plants growing, and shall have to wait another year to know if they are sterile, but that is another question. But as we know that there is an immediate effect on the seed in crossing in Indian corn, the *Verbascum* experiment simply shows one more case where there is none.

THOMAS MEEHAN.

Teratological.—I have seen, this year, a common cooking-bean with three cotyledons; also, within a few days, a horsechestnut bur containing three perfect seeds.

W. W. BAILEY.

Rudbeckia.—I see by Dr. Gray's Synopsis, just received, that what I figured as *Rudbeckia fulgida* in my Flowers and Ferns he regards as *R. speciosa*. What I have said about *R. fulgida* in my note on page 94 of the BULLETIN refers to his *speciosa*.

THOMAS MEEHAN.

Synspermy in the Horsechestnut.—After sending a note lately upon a three-seeded horsechestnut, I found those with two seeds so common as to be unworthy of mention. So perhaps is the case I cited. Now, however, I can record a greater rarity, viz., a complete union of two seeds into one, the attachment being at the hilum. As I wish to preserve the specimen, I have not dissevered the parts to ascertain whether the union is by more than the integuments, but it looks as if it were. Under *Synspermy*, Dr. M. T. Masters, in a footnote, gives the case of *Æsculus Hippocastanum*, but considers the phenomenon unusual.

Providence, R. I. W. W. BAILEY.

Note on the May-Apple.—Prof. T. C. Porter kindly sends me a copy of the *Botanical Gazette*, 1877, No. 9, describing essentially the

same variations of growth shown in Fig. 9 of my notes (BULLETIN, p. 63). The figure of his aphyllous form would indicate an abortion of the leaves, there being a distinction made between stem and peduncle in the figure. In my specimen this was not so. The various forms were not accounted for by abortion of leaves—the occurrence of three-leaved forms would preclude that—but by the flower not being preceded by the same number of leaves, these varying from 3 to 0. Perhaps Prof. Porter's aphyllous form indicates that the leaves were *potentially* present.

AUG. F. FOERSTE.

Prolification in Phleum.—While driving in New Hampshire early in October I found a curious proliferous specimen of *Phleum pratense*. The spike was fully an inch thick, with tufts of spreading green leaves. A week later, in Massachusetts, I found a second specimen, with the same development, and a few days afterwards, in Connecticut, still another.

ANNIE TRUMBULL SLOSSON.

Note on Sphærella polystigma, E. & E. (BULL. TORR. BOT. CLUB Vol. x., p. 127.)—This species has also been found at Newfield, N. J., on fallen leaves of *Quercus coccinea*, and a recent examination of these specimens, which were collected in the summer of 1883, shows that the endochrome of the sporidia becomes at length divided close to the narrow end of the spore, forming a pseudo-septum. This character was not noticed in the fresh specimens, but possibly may have been overlooked, though it is not by any means unusual for spores which are at first continuous to finally become septate, and especially so in those which are at first nucleate; so that two nuclei indicate the probable appearance of a septum; three nuclei of two septa; four, of three, and so on; a single septum appearing between the adjacent nuclei; and this fact is not to be lost sight of in estimating the value of genera founded on the septation of the spores.

The measurement of the sporidia (10–13x3.5–4μ) was accidentally omitted.

J. B. ELLIS.

Wanted.—Any one having a perfect copy of Michaux's Sylva may hear of a purchaser upon stating terms to the editor of the BULLETIN.

Errata.—In Dr. Britton's article, in the August number of the BULLETIN, the following errata occur, and should be corrected as follows:

Under *Cyperus Buckleyi*, for "spikelets 15 lines wide" read "1.5 line wide." Under *Cyperus articulatus*, "spikelets 1–15 inches long" read "1–1.5 inch long," and for "showing" read "forming." On page 86, bottom line, and on page 87, line 20, read Nees for Rees.

On page 98, line 21, for "mode" read "made," and in line 34 for 1885 read 1884; on page 100, lines 30 and 31, the phrase beginning with "but" and ending with "*Empetrum*" should be enclosed in parenthesis. On page 105, line 4 from bottom, for 1857 read 1837.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XI. New York, Nov. and Dec., 1884. **[No. 11 & 12.**

Kansas Fungi.*

By J. B. Ellis and W. A. Kellerman.

Cercospora Apocyni.—Amphigenous, on small (1–3$^{mm.}$) brown spots with a narrow raised border; often occupying only a small (1$^{mm.}$) circular area on the brown spots, or sometimes several small white patches of conidia on the same spot; hyphæ very short, 16–20 x 2.5μ, tufted, hyaline, simple, entire; conidia narrow-cylindric, 45–60 x 2.5μ, granular and becoming faintly 3–4-septate.

The spots are at first purplish brown, with a purplish border, but become rusty brown except where whitened by the conidia. On leaves of *Apocynum*. Aug. No. 601.

Cercospora Desmodii.—On reddish brown, roundish or irregularly shaped and rather indefinitely limited spots 2–3$^{mm.}$ in diameter; hyphæ mostly hypophyllous, 70–80 x 3–4μ, brown, 1–3-septate, undulate or often abruptly bent above, rising in loose spreading tufts of 6–8 from a minute tubercular base; conidia oblong-cylindric and nucleate, becoming clavate-cylindric and mostly 3-septate, 30–50 x 3.5–4μ.

The spots become more or less confluent and the leaf assumes a reddish brown hue. On *D. acuminatum*. July. No. 585.

Cercospora Cephalanthi.—On orbicular (1–4$^{mm.}$) red-brown spots with a narrow, dark, raised border; hyphæ mostly epiphyllous, tufted, brown, continuous or faintly septate 24–30 x 3–4μ, at length elongated (40–56μ) and crooked or undulate above; conida (mature?) subfuscous, oblong-cylindric, 20–30 x 3–4μ, 1–3-septate.

The tufts of hyphæ are very minute and meagre and are seen with difficulty. The conidia, are not abundant. On leaves of *C. occidentalis*. July. No. 582.

Cercospora Gymnocladi.—Mostly epiphyllous on suborbicular, grayish brown spots (3–4$^{mm.}$) with a discolored border; hyphæ in minute punctiform tufts, simple, continuous, brown, 18–25 x 4μ; conidia clavate-cylindric, brown, 3–6-septate, 45–60 x 5–6μ, but often wanting the narrow base, and much shorter (25–35μ), 2–3-septate and occasionally constricted at the septa.

On leaves of *Gymnocladus Canadensis*. July. No. 571.

Cercospora Pentstemonis. — Amphigenous, on orbicular (.25–.5$^{cm.}$) purplish brown spots (whitening out), with a narrow raised border surrounded by a purplish discoloration; hyphæ brown, continuous, nearly straight, subattenuated and more or less denticulate above, 25–35 x 3μ, forming dark tufts 70–80μ across and thickly

* Continued from page 116.

scattered over the spots; conidia brownish, swollen or enlarged above, 2–2.5μ thick, and, with the slender filiform base, 40–75μ long, nucleate, becoming faintly 1–3-septate.

Many of the conidia lacking the slender base are much shorter (20–25μ). On leaves of *Pentstemon Cobæa* (No. 546) and *P. grandiflora* (cult.) No. 566. June.

CERCOSPORA CHIONEA.—Amphigenous but mostly epiphyllous, on large (.5–1$^{cm.}$, or, by confluence, 3–4$^{cm.}$) dark reddish brown spots with a brown, yellow-shaded, but not raised, border; hyphæ densely tufted, subhyaline, mostly 18–30 x 4–5μ, but often elongated to 35 or 40μ and then somewhat undulate or crooked above; conidia vermiform or clavate-cylindric, 54–90 x 4–5μ and 3–8-septate.

The conidia are very abundant and appear to the naked eye like a sprinkling of white powder on the brown spots. Different throughout from *C. cercidicola*, Ell. On leaves of *Cercis Canadensis*. July. No. 580.

CERCOSPORA MURINA.—Hypophyllous, on large (.5–1$^{cm.}$), roundish, indefinitely limited, dirty brown spots (dirty white above); hyphæ effused, mouse-colored, branched, septate, clear fuscous brown, 75–100 x 3–4μ; conidia oblong or oblong-cylindric, 3-septate, brownish, sometimes slightly constricted at the septa, 25–35 x 4–5μ.

Looks like a fine mouse-colored down overrunning spots previously occupied (?) by another *Cercospora* (*C. granuliformis*, E. & H.)

CERCOSPORA VELUTINA.—Amphigenous; hyphæ pale olivaceous, simple, continuous, more or less bent and toothed above, forming a dense velvety growth over the surface of little dark-colored tubercular swellings 1$^{mm.}$ or less in diameter, which are collected in groups or irregularly scattered over the surface of the leaf; conidia pale olive-brown, subequal or attenuated above, curved, sparingly septate 75–100 x 3μ.

On leaves of *Baptisia*. Aug. No. 622.

RAMULARIA GRINDELIÆ.—Amphigenous, erumpent, punctiform; hyphæ densely tufted, simple, hyaline, straight, 18–25 x 3–4μ; conidia cylindric, straight or slightly curved, hyaline, 1–2-septate, 20–40 x 3–4μ.

The tufts of hyphæ (150–200μ in diameter) are collected in little groups forming rusty yellow specks thickly scattered over both sides of the leaf and finally whitening out.

This might be referred to *Cercospora* from its habit and mode of growth, but the conidia and hyaline hyphæ are those of *Ramularia*. On leaves of *Grindelia squarrosa*. Aug. No. 616.

SPHÆRELLA DECIDUA.—Perithecia visible on both sides of the leaf, of coarse cellular structure, depressed-globose, 100μ in diam., asci oblong, sessile, 50 x 15μ; sporidia crowded or biseriate, oblong or oblong-pyriform, uniseptate and constricted, mostly a little curved, 12–11 x 4–5μ; perithecia in small (1–1.5$^{mm.}$) round, dull white, translucent spots with a narrow raised border; spots on dead, discolored parts of the leaf which finally fall out and leave irregular-shaped holes as if the leaf had been eaten out by insects.

On living leaves of *Vernonia*. June. No. 556. Also on *Scrophularia nodosa* (No. 563); spots white and more confluent and mostly not on dead, but living green parts of the leaf.

SPHÆRELLA CERCIDICOLA.—Perithecia erumpent (100μ) scattered, mostly on the upper side of the leaves, at length broadly perforated above; asci oblong-cylindric, 35 x 5μ; sporidia closely packed, overlapping and subbiseriate, oblong-pyriform, 1-septate, 11–13 x 2.5–3μ, slightly curved and constricted.

On fallen leaves of *Cercis Canadensis*. June. No. 550.

SPHÆRELLA LACTUCÆ.—Epiphyllous, on dark brown (2–4μ), concentrically wrinkled spots with a distinct raised border; perithecia erumpent subglobose (120–150μ), of coarse cellular structure; asci 40–75 x 12–14μ, sessile, oblong; sporidia biseriate, ovate-oblong, 1-septate and constricted at the septum, 14–16 x 5–μ, ends obtuse.

On living leaves of *Lactuca Canadensis*. Aug. No. 619.

The Nectar-Glands of Apios tuberosa.

By AUG. F. FOERSTE.

The flowers of *Apios tuberosa* are arranged in dense panicles, which have the appearance of racemes. At the base of the first main axis are two small bracts, one of them frequently subtending another panicle. The main axis of the second panicle has also two bracts at its base, one of which sometimes subtends a third flower-cluster in an insignificant rudimentary state. The third flower-cluster rarely, if ever, develops. The second panicle arises so close to the base of the first panicle that both seem to spring from the axil of the leaf.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Although but one of the basal bracts usually subtends a panicle, the other not rarely subtends a minute rudimentary flower-cluster, which rarely develops its flowers. The main axis of each panicle bears at short distances the secondary axes or racemes, each of which is subtended by a bract. Each raceme (Fig. 1) bears three flowers, all of them subtended by bracts. Two of the flowers are placed at either side of each raceme, the third being placed just above the bract subtending the raceme. The bract (Fig. 2 *b*) of the third flower is smaller than the one subtending the raceme (Fig. 2 *c*). The three flowers are placed at the very base of the short stubby axis of the raceme, and are inserted at about the same height. The top of this axis (Fig. 2 *a*) suddenly becomes truncated, and on the flattened surface thus produced may be seen the remaining aborted flowers of the raceme. Under a low power of the miscroscope they appear as so many clusters of lanceolate, thin scales. These clusters usually wither and fall off a short time before the flowering of the three

lower members of the raceme. Their locality, however, is marked by small rings (Fig. 3) slightly raised above the flat surface formed by the end of the axis. While the lower flowers of the raceme are in blossom the rings representing the points of attachment of the upper flowers are exuding a kind of honey. It is necessary to mention, however, that only one or two of these rings seem to yield honey at the same time. This flows quite freely, and when removed by my hand was usually replaced in less than two or three minutes. The honey-glands, being extra floral, seem to take no part in any adaptation for cross fertilization, but they are abundantly visited by ants. Several plants growing in my garden are almost covered with them. There are ants going up and down the vines. Every panicle on the entire plant has one or more insect visitors upon it. Some panicles have seven or eight ants upon them, one to every gland in full operation. Ants are usually supposed to be beneficial to plants of this kind by warding off the insect enemies to which they may be subject. It may be noted in connection with this that my plants are free from insects before the period of honey secretion, as well as afterwards; still, any insects trying to get at the flowers during their period of blossoming would find themselves in rather an uncomfortable

Fig. 5

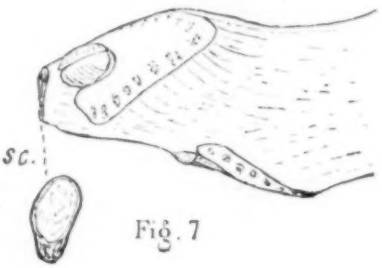

Fig. 7

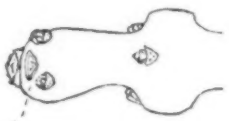

Fig. 6

position and would be effectually *crawled over* by the ants. The flowers, after anthesis, wither and fall off at a joint between the flower and pedicel. The pedicel falls of later at a joint next the axis of the raceme. A very remarkable discovery to me, however, was the fact that the ends of the panicle, together with the raceme that belongs to them, never mature. The entire panicle appears perfectly healthy until a short time before anthesis, then *the ends of the panicles* (Fig. 4) *suddenly wither and fall off at a clean-cut joint*, hence *all panicles in the flowering state are really truncated.* The end of the panicle shown in Fig. 4 had thirteen racemes upon it, each with its three flowers and truncated axis; the very summit of the panicle I forgot to examine. It was a curious sight to see panicle after panicle lose its end without any special reason for such an operation that I could discover. The pedicels of the flowers, in dropping off, leave a circular scar (Fig. 2 *d*) similar to those left by the aborted flowers. The latter are arranged "spirally" on the truncated end of the axis. In the specimen figured (Fig. 3) the spiral turned toward the right, and the sixth pit or ring stood next to the first. The first two or three of these rings are the honey producers. The three developed flowers

do not maintain a spiral arrangement similar to the aborted flowers, but an examination of the plant would readily show that displacement is unavoidable. Of the flowers, one of those at the side blossoms first, then the one on the opposite side, and lastly the one in the

Fig 10

Fig 8

Fig. 9

middle. The arrangement of the various flowers has not been sufficiently studied to *settle* the phyllotactic arrangement of those on the axis of the raceme. How necessary bees are to insure fertilization may be seen from the fact that those clusters which escape the attention of bees by being too much hidden by the surrounding foliage, never spring the keel, so that the flowers wither and die without the keel being loosened. (Gray, Struct. Bot. p. 218). Flowers thus unsprung seem to last longer.*

In connection with this it may be interesting to note that in *Tilia Americana* (Fig. 5) *Catalpa speciosa* (Fig. 6) and *Ailanthus glandulosus* (Fig. 7) the terminal part of the leaf branches falls off, leaving a clean scar (*sc*). The branches are continued by buds in the axils of lower leaves. In *Hamamelis Virginica* (Figs. 8, 9 and 10) the leaves fall off in autumn and leave a scar. In the following spring a plane has been formed just beneath the scar of the former year. At this plane the leaf-scar of the former year falls off leaving another scar for the spring time. This singular phenomenon might be called that of a "deciduous leaf-scar." The accompaning drawings will make unnecessary all further description.

Description of Figures.—*Apios tuberosa.* Fig. 1. Entire raceme seen from above. Fig. 2. The same x 5; flowers fallen off, pedicel of middle flower remaining: *a*, truncated axis of the raceme; *b*, bract subtending the middle flower; *c*, bract subtending the raceme; *d*, circular depression left by the pedicel of the flowers. Fig. 3. Truncated axis of raceme x 5, showing attachment of flower-pedicels. Fig. 4. Deciduous end of the panicle. Fig. 5. *Tilia Americana:* scar, *s c*, of leaf-branch. Fig. 6. *Catalpa speciosa:* scar, *s c*, of leaf-branch. Fig. 7. *Ailanthus glandulosus:* scar, *s c*, of leaf-branch. Figs. 8 and 9. *Hamamelis Virginica;* front and side views of leaf-scar before falling off. Fig. 10. Deciduous leaf scar.

New Grasses.

By George Vasey.

Stipa Scribneri.—Culms 2–3 ft. high, stout, erect; lower leaves half as long as the culm, smooth, flat below, becoming involute at

* Note. The following from Prof. Trelease is of interest: "The sort of glands you find in *Apios* are also found in other Leguminosæ, e.g., species of *Dolichos Phaseolus*, and *Canavalia*. I have noticed them in all but the last named genus; probably they occur in many others.

References: Trelease, in Comstock's Report on Cotton Insects, 1879. 325; *American Bee Joural*, 1880, xvi., 271–2., Figs. 9–10. Delpino, in Atti della R. Universita, Genova, 1880, iv., part i. p. 27."

the long acuminate point; upper sheath enclosing the base of the panicle, which is narrow, erect, and 6–8 inches long, the branches in twos or threes and appressed; outer glumes unequal, lower one 6–7 lines, upper about 5 lines long, both 3-nerved, acuminate; flowering-glume 3–5 lines long, hairy, hairs longer above, and at the apex forming a white crown a line or more long; awn rather slender, 8–9 lines long, not hairy; stipe short, very acute, pubescent; palet less than a line long, obtuse and adherent to the grain.

Differs from *S. viridula* particularly in the unequal glumes, the hairy crowned flowering-glumes, the more slender awn, and the very short palet.

Collected on dry hill-sides at Sante Fe, New Mexico.

FESTUCA CONFINIS.—Culms about 3 ft. high, rather rigid, smooth, radical leaves half as long as the culm, those of the culm 2 or 3, the sheath loose and shorter than the internodes, blade flat, 6 inches long, 3 lines wide, ligule short, scarious, obtuse; panicle 4–5 inches long, strict; branches in twos or threes, unequal, erect, the longest twice as long as the internodes, subdivided below the middle, rhachis and branches nearly smooth; spikelet oblong, 3- to 5-flowered, the outer glumes ovate-lanceolate, thin, smooth, 1-nerved, the upper one about 3 lines long, the lower a little shorter; flowering-glumes about 3 lines long, prominently 3-nerved, scabrous, rather rigid, rounded on the back, acutish to very acute, but not awned; palet about equaling its glume, scabrous-ciliate on the keels, adherent to the grain.

This differs from *Poa* chiefly in the rigidity of the culms and the thicker, harsher, more rounded flowering-glumes.

Collected at Peu Gulch, Colorado, altitude 8,000 ft.

ELYMUS SAUNDERSII.—Culms tufted, 2–3 ft. high, slender but firm, smooth; radical leaves involute-setaceous, about half as long as the culm, culm-leaves about 3, the sheaths smooth, the upper one long, the blade rigid, 5–6 inches long, finely scabrous, becoming involute, ligule obsolete; panicle 5–7 inches long, rather cylindrical and flexible, rhachis with 20 or more joints, which are 3 to 4 lines apart; spikelets 2- to 4-flowered, generally in pairs, at least below, frequently singly above and sometimes throughout; upper glumes linear-lanceolate, 3- to 5-nerved below, with 2 short teeth at the apex, scabrous on the midnerve and running into a slender scabrous awn an inch or more in length; flowering-glumes lanceolate, 5-nerved, finely scabrous, 2-toothed at apex, 5 lines long to the awn, which is slender and 1 to 1.5 inch long; palet wide and flat, nearly as long as its glume, bifid, scabrous on the 2 sharply flexed keels. The whole spike generally of a purple color.

One of the handsomest species of the genus. Collected at Veta Pass, Colorado, 9,000 ft. altitude.

On the Existence of a Peculiar Flora on the Kittatinny Mountains of North-western New Jersey.

By N. L. BRITTON.

The occurrence of a group of plants which, from preconceived notions, seem to be out of place in any region, is always of interest to

botanists, and especially so to those who enjoy the study of the geographical distribution of species and its various causes. I can contribute a brief chapter to the literature of this subject with some facts obtained during two recent expeditions to the Kittatinny (Shawangunk) Mountains of New Jersey and New York, made for the purpose of more thoroughly elaborating the flora of the former State.

This mountain chain forms a wall of almost constant altitude, averaging over 1,200 feet in height, along the eastern side of the valley of the Delaware River, from Port Jervis to the Water Gap, and excludes many plants of more northern and western range from the interior portions of New Jersey. Its summits and western slopes are composed of a coarse or fine, very hard silicious conglomerate or sandstone, with little soil but that derived from the limited disintegration of these rocks. While the mountain sides and summits are extensively glaciated, there is very little glacial drift on the ridge, as Dr. A. A. Julien has pointed out* for the vicinity of Sam's Point, New York, and my observation is that it holds this character throughout its extent in New Jersey. The soil of the summit and slopes is consequently highly silicious.

My first trip was made on August 31st, 1883, to the vicinity of High Point, Sussex Co., and the following unlooked for plants were noticed:

Juncus Greenii, Oakes & Tuckerm., a species previously known only from sandy soil along or near the coast, was found on the very top of High Point at an elevation of 1,800 ft. The plants were somewhat smaller than those growing abundantly at several points along the Raritan River, the Staten Island, Long Island and New England coasts, but Dr. Engelmann pronounced them this species, shortly before his death. *Solidago puberula*, Nutt., was very abundant on the mountains, both here and at Sam's Point, and constantly associated with *S. bicolor*. Before this I had been accustomed to find it only along and near the coasts and in the sandy plains of the southern part of the State. *Orontium aquaticum*, L., grew along the shore of Lake Nascia, a pond just below the summit.

These plants and the shortly previous discovery by Mr. A. H. Smith, near Lake Mohunk,† of *Corema Conradii*, Torr., a plant whose limited distribution renders its presence there doubly interesting, induced me to make special search for other sand-loving species during my visit to the same region on June 15th of the present year. As the result of this, *Prunus pumila*, L., the sand cherry, which grows on sand bars and islands in the Delaware River, and in similar situations northward, was found on the summit of the mountains southwest of High Point, among dry rocks; *Tephrosia Virginiana*, Pers., and *Lespedeza hirta*, Ell., so abundant in sandy soil southward, in several places on the western slope; *Lupinus perennis*, L., and *Calystegia spithamæa* Pursh, near the summit, and the latter known at present from but two other localities in New Jersey, but generally a sand plant. The immense quantities of *Quercus ilicifolia*, Wang. (in the

* *Trans.* N. Y. Acad. Sci. Vol. iii., ined.

† See BULL. TORR. CLUB, ix.

Shawangunks, as in the pine barrens, the most abundant shrub), and the substitution of *Pinus rigida*, Mill., the pine barren pine, on the mountains, for the *P. Strobus*, L., of the surrounding country, contribute to the list of plants whose natural habitat is low sandy ground rather than elevated mountain districts, though the last named may hardly be regarded as typical of sandy regions.

The reason for these somewhat remarkable occurrences is easily found in the similarity of the soil on the mountains, in chemical composition, to that of the plains bordering the coast, this being with some of these plants evidently more potent than climate, for the average annual temperature of these mountain districts is seven or more degrees lower than that of the sea-coast.* This has its effect, however, in modifying the flora, as seen in the *Potentilla tridentata* and *Pyrus Americana*, DC., of High Point, *Stellaria borealis*, Bigel., and *Habenaria viridis*, L., var *bracteata*, Reich., of its slope; *Arenaria Grœnlandica*, L., and *Juncus trifidus*, L., of Sam's Point, with other plants of northern range.

Notes on South-western Plants.—The appearance of Dr. Gray's long-expected work on Compositæ calls for changes in the names under which several of my plants were distributed.

*663=*Malacothrix sonchoides*, T. & G., but the crown is plainly about 30-toothed.

*665 } =*Senecio multilobatus*, T. & G.
*666 }

*203=*Trixis angustifolia*, DC., var. *latiuscula*, Gray.

*670=*Senecio Douglasii*, DC.

*651=*Bigelovia Drummondii*, Gray. A form of *Bigelovia graveolens*, Gray, collected at Casuino, A. T., differs from the description in having the leaves distinctly rigid.

*780 is not *Verbena polystachya*, but probably an extreme form of *V. stricta*, Vent. It requires further comparison.

The following notes should be published as extending the ranges of species beyond those credited to them.

Lonicera involucrata, Banks, Mt. Humphreys, A. T.
Galium Rothrockii, Gray, Mogollon Mts., N. M.
Stevia Plummeræ, Gray, Mogollon Mts., N. M.
Kuhnia eupatorioides, L., at various places in N. M., and A. T.
Brickellia floribunda, Gray, Burro Mts., N. M.
Aphantostephus Arizonicus, Gray, Central N. M.
Erigeron glabellus, Nutt., Mogollon Mts., N. M.
Erigeron flagellaris, Gray, Central Arizona.
Erigeron Rusbyi, Gray, Mogollon Mts. of South-western N. M., not of A. T.
Helianthus Maximiliani, Schrader, Central Arizona.
Coreopsis Drummondii, T. & G., Central Arizona.
Schkuhria Hopkirkia, Gray, Western N. M.
Hymenopappus Mexicanus, Gray, Northern Arizona.
Polypteris Hookeriana, Gray, Central N. M.

* See Mr. J. C. Smock in Ann. Rep. State Geologist for 1881.

Actinella Bigelovii, Gray, Northern Ariz.
Actinella biennis, Gray, Central Ariz.
Actinella Rusbyi, Gray, Northern Ariz.
Dysodia Cooperi, Gray, Western Ariz.
Hymenatherum polychætum, Gray, Central N. M.
Artemisia franserioides, Greene, Mogollon Mts., N M.
Artemisia Bigelovii, Gray, Northern Ariz.
Tetradymia glabrata, Gray, Northern Ariz.
Senecio Neo-Mexicanus, Gray, Central N. M.
Senecio tomentosus, Mx., Clifton, South-eastern, A. T.
Senecio Rusbyi, Greene, Central N. M.
Perezia Wrightii, Gray, N. M. and Central Ariz.
Lygodesmia spinosa, Nutt. Northern Ariz.
Lactuca pulchella, HBK, Northern Ariz.
Taraxacum officinale, Weber, Prescott, Ariz.

It may be well to make these notes the text of a few remarks on the topographical relations of Northern Arizona, as bearing on the constitution of its flora. The north-eastern portion of the Territory forms a continuation of the high land of Utah, the plateau terminating suddenly in a line extending from the western termination of the Colorado Cañon, south-eastward to the south-western portion of New Mexico. This line is very irregular, and exceedingly abrupt, presenting a series of broken precipices, often from 1,000 to 2,000 feet in height. To the eastward this plateau is pretty intimately connected with that of New Mexico, the shallow and gradual valley of the Little Colorado forming an avenue for, rather than a barrier to, an interchange of species. With the mountains of South-western New Mexico a direct connection is found in the forest-belt which skirts the edge of the plateau, and is known, at least in the north, as the San Francisco Forest. We should look, then, in Northern Arizona, for the representatives of four quite distinct floras, and these we actually find, all of them being represented in the short list given above. The Mohave Desert is connected by a rather gradual slope with the north-western section, but this slope at length ends abruptly at the base of the north-eastern plateau as above described. On this lowland we find many species characteristic of the South-Californian deserts. In the list, *Dysodia Cooperi*, not before reported from East Colorado River, represents this immigration. The plants of the comparatively low land of Central Arizona, such as *Coreopsis Drummondii*, *Helianthus Maximiliani* and *Perezia Wrightii*, also encroach, here in the west, on the northern section, but are elsewhere very effectually checked by the line of cliffs, so that on the plateau above, all the affinities are with the north, east and south-east. I point in the list to *Lonicera involucrata*, *Artemisia Bigelovii*, *Tetradymia glabrata*, *Lygodesmia spinosa* and *Erigeron glabellus* as well marked illustrations of this southern encroachment, all being now for the first time reported from south of the Arizona line. The last named has doubtless made its way into New Mexico by way of the elevated forest-belt referred to. From the plains of New Mexico, *Kuhnia eupatorioides* and *Bigelovia Drummondii* have moved westward, the latter obviously traveling down the Colorado Chiquito, while that Territory

has in return received *Aphantostephus Arizonicus* and *Schkuhria Hopkirkia*. But most marked of all is the interchange of species along the line of the forest-belt. The resemblance between the flora of the Mogollones of South-western New Mexico, where the summer of 1881 was chiefly passed, and that of the San Francisco and Mogollones of Arizona, where I staid in 1883, was very striking. Among the most conspicuous species in the vicinity of Clairmont, N. M., were *Pentstemon linarioides*, *Actinella Rusbyi*, *Hymenopappus Mexicanus* and *Aster canescens*, with *Helenium Hoopesii* at a higher altitude. About Flagstaff, A. T., the same species abounded, imparting a striking similarity to the landscape. *Senecio Rusbyi* was also here rediscovered and is probably to be found all the way down the highland to the New Mexican Mogollones. *Cupressus Arizonica* also follows the western side of this highland to Southern Arizona, but has not yet appeared from New Mexico. It may be added that those very interesting Mogollon Mountains of New Mexico are also very intimately connected south-westward with the mountains of Southern Arizona, from which source they have received *Galium Rothrockii*, *Stevia Plummeræ*, *Primula Rusbyi*, *Brickellia floribunda* and *B. oliganthes*.

H. H. Rusby.

Notes on New England Marine Algæ, IV.—The following species have not before been reported from New England, and all with the exception of *Ulva marginata*, found by Prof. Farlow in algæ from Salt Lake, Utah, are, as far as I know, new to the United States.

Microchæte grisea, Thuret, Notes Algologiques, Plate xxx. On an old pecten shell at West Falmouth, Mass., in company with *Calothrix crustacea*, Thuret. Resembling a small *Calothrix*, from which it differs in having no terminal hair, the trichome ending in a rounded cell instead of a point; known heretofore only on the coast of France. I am indebted to Dr. E. Bornet for the identification of this plant.

Nodularia litorea (Kütz.), Thuret. A few filaments among *Lyngbyæ*, *Ulvæ*, *Calothrix*, etc., in marshes at Hampton, N. H., in company with *N. Harveyana*, Thuret; the filaments are about twice the diameter of those of the latter species. Figured in Notes Algologiques, Plate xxix.

Rhizoclonium (*Linum*), Thuret. I have found at Kennebunkport, Maine, Hampton, N. H., and Nahant, Mass., a plant which agrees with authentic specimens of this species from Cherbourg, France. The filaments are from .10 to .12 mm. in diameter, and often much curled and twisted. It seems quite distinct from the *Chætomorpha Linum* of Farlow's Manual, which is about twice this diameter, and resembles rather *Rhizoclonium tortuosum*, which, however, is only half its size.

Chætophora maritima, Kjellman, Spetsbergens Thallophyter, Plate v., Figs. 15 and 16. At Kennebunkport, Maine, I found in an upper tide-pool, growing in a dense mass of *Calothrix scopulorum*, Ag., *Oscillariæ*, etc., a few filaments agreeing with Kjellman's description and plate. They did not, however, form a definite thallus, and if they belong to this species are probably a reduced form,

growing at its extreme southern limit; probably farther north and east it would be found more fully developed.

Ulva percursa, Ag., (*Enteromorpha percursa*, J. Ag.) Growing in upper tide-pools at Kennebunkport, Maine, Hampton, N. H., and Cohasset, Mass., and probably common in tide-pools and marshy places along the coast. It is undistinguishable by the naked eye from the various *Ulvæ* and *Rhizoclonia* found in similar localities, but is easily recognized on microscopic examination by the frond composed of two longitudinal series of symmetrical cells. It is figured in Areschoug, Phycæ Scandinavicæ Marinæ, Part 2, Plate ii. A.

Ulva marginata, LeJolis. (*Enteromorpha marginata*, J. Ag.) Weymouth and Quincy, Mass., growing on woodwork; distinguished by its dark green, narrow, slightly branched, flattened frond, composed of a few longitudinal series of small, elongated cells, the marginal series differing somewhat in depth of color from the central. This is the *Ulva* referred to in my note in the BULLETIN of March, 1884.

Ulva aureola, Ag. (*Enteromorpha aureola*, Kütz.) Growing in small quantities among *Ulvæ*, *Lyngbiæ*, *Rhizoclonia*, etc., in the marshes at Hampton, N. H. The cells, which are arranged in longitudinal series, look like a *Gtœocapsa*. Figured in Hauck, Die Meeresalgen Deutschlands, Fig. 190.

Myrionema orbiculare, J. Ag. On *Zostera marina*, Kennebunkport and Hampton. Differs from the common *M. vulgare*, Thuret, by the presence of peculiar, saccate, hair-like growths, in addition to the usual hairs and paraphyses. Figured in Hauck, Meeresalgen, Fig. 132. I am indebted to Prof. J. G. Agardh for the identification of this species, and for valuable assistance in determining various forms of the Ulvaceæ.

Porphyra coccinea, J. Ag. On *Desmarestia aculeata*, Lamour., at Hampton, N. H. A very delicate alga, with a thinner frond and much smaller cells than any other American *Porphyra*. I found it only once, a floating plant of *Desmerestia* being pretty well covered with the delicate fronds, which, when lifted out of the water, collapsed like one of the finer Callithamnions. Figured in Agardh, Till Algernes Systematik, vi., Plate ii., Figs. 41-43.

Porphyra miniata, Ag. The Nahant plant which I mentioned in the BULLETIN for May, 1882, under the name of *P. leucostica*, Thuret, seems to belong rather to this species. I have since found it at Kennebunkport and at Hampton, at both of which places it seems to be not uncommon in the summer, growing on other algæ, or washed up from below low-water mark. The antheridia do not form patches of any considerable size, but are scattered in groups of a few cells throughout the frond. This is a characteristic arctic species, and adds another to the list of extreme northern species that have been found extending quite a distance south on the American coast. Its occurrence in the same locality with *Dasya elegans*, Ag., is a curious instance of the meeting of northern and southern forms in Massachusetts Bay. *P. miniata* is figured in Agardh, Till Algernes Systematik, vi., Plate ii., Figs. 44-48.

I have received what appears to be the true *P. leucosticta* from

Rev. J. D. King, collected at Cottage City, Mass., and from Mr. S. R. Morse, collected at Atlantic City, N. J.

Kallymenia reniformis, Ag. A single specimen, with cystocarpic fruit, washed ashore at Revere Beach, Mass., April 27th, 1884. In appearance it much resembles some forms of *Rhodymenia palmata*, Grev., but the color is a somewhat different shade of red; the microscopic structure is quite distinct. It is figured in Harvey, Phycologia Britannica, Plate xiii., and has not been previously recorded as found outside of northern Europe.

FRANK S. COLLINS.

Corema Conradii.—Much may be done towards elucidating the probable origin and past history of our native plants, by carefully tracing their local and geographical distribution in the way Mr. John H. Redfield has done in his interesting paper on *Corema Conradii* in the TORREY BULLETIN for September, p. 97. As the details given under the head of "Nova Scotia and Newfoundland" are meagre, and Mr. Redfield appeals to botanical brethren in the British Provinces for further facts, I cannot well resist contributing my mite, notwithstanding the supplementary records in the October number, some of which relate to this Province.

In the spring of 1864, soon after my arrival in Nova Scotia, I found the *Corema* blooming abundantly on a bare ridge of quartzite rock, eleven miles to the north of Halifax city. Wherever there was a crevice or crack in the rock there were tufts of *Corema*, with stiff wiry stems. It was about the only flowering-plant on these barren rocks. I soon found that the *Corema* was not rare in the district, and could discern it in heath-like tufts on the bare rocky hills from the railway cars, in many places. The auriferous quartzite rocks to which I refer stretch along the Atlantic coast district of Nova Scotia throughout nearly its whole extent. Wherever they are bare enough to resist more leafy plants, *Corema* is apt to be found. It is usually associated with *Vaccinia*, *Cornus Canadensis Gaultheria procumbens*, *Polypodium vulgare*, and, less frequently, *Arctostaphylos Uva-ursi*. On level ground, where the soil is very poor, consisting of gravel or sand, the *Corema* also occurs, not only in our Atlantic Coast district, but in other parts of the Province; in such situations it does not grow in distinct tufts, but becomes more gregarious, exclusively occupying large areas, and is usually much dwarfed in growth, the stems being often only a very few inches high. I shall endeavor next summer, by aid of my students and correspondents, to trace the distribution of *Corema* throughout this Province with more exactness.

In Nova Scotia the *Corema* has been so often mistaken for Scotch heather (*Calluna*) that I have frequently wished it were less abundant. Compared with *Corema*, *Empetrum nigrum* is, with us, comparatively rare.

Dalhousie College and University, Halifax. GEORGE LAWSON.

Big grape-vines.—In the BULLETIN for February, 1882, I gave a statement of a grape-vine I had visited and measured at Baisden's Bluff near Darien, Ga. There were two errors in the accouut, which

may as well be corrected here, so as to have it accurate. The types made me say "just in leaf," instead of "not in leaf," and also that the measurement was made at "eight feet from ground" instead of "one foot." I stated that it being not in leaf (I visited it early in March) I had no means of ascertaining the species, but judged from the appearance of the trunk it was *æstivalis*. I obtained leaves during the past summer from a friend, and verified the fact of its being that species.

But my object in this communication is to place on record the measurement of another and larger vine, probably the largest wild grape-vine known.

During the past summer, by appointment of our State Commissioner of Agriculture, I had charge of the collections in the botanical department of our State exhibits for the New Orleans Exposition, including specimens of our native woods, grasses, etc. Having heard of a famous grape-vine in the lower part of the State, near the old Sheldon Church in Beaufort Co., I endeavored to procure a section of the trunk for the Exposition. The owner of the grounds, Mr. H. M. Fuller, was unwilling to cut it down, but gave the measurement as follows (I quote from his letter): "At ground 59.5 inches circumference; at two and a half feet from ground, where it divides into two branches, 57.5 inches in circumference."

If Mr. Fuller is correct in his measurement (and I have no reason to believe otherwise) this gives a diameter of nearly 20 inches, and the vine is probably the largest on record.

I have requested a leaf to be sent to me, to ascertain the species, but have not received it, and I fear it is now too late in the season.

Aiken, S. C. H. W. RAVENEL.

Bouteloua gracilis.—Two American botanists whose writings are frequently quoted have employed this name, *Bouteloua gracilis*, in their published works and in both instances there has been a double error committed. In order that these errors may not be repeated in future works, I desire to call attenion to them and point out the correction. I may say that in both cases the grasses described under this name are referred to it with a query. "*Bouteloua gracilis*, Hook.?", Vasey, in the Botany of Wheeler's Report, page 287, is *Bouteloua aristidoides*, Thurb. (*Dinebra aristidoides*, HB K., *Eutriana aristidoides*, Kth.) A South American species was published by J. D. Hooker (Acta Lin. Soc., xx., 173,) under the name of *Eutriana gracilis*, but no such species appeared by that author under *Bouteloua*.

"*Bouteloua gracilis*, HBK?," Chapman, in Southern Flora, Suppl. p. 663, is *Bouteloua hirsuta*, Lag. The species intended by Dr. Chapman was, I doubt not, *Chondrosium gracile* of Humbold, Bonpland and Kunth, to which the Florida specimens have some resemblance. These authors published no species under *Bouteloua*.

F. LAMSON SCRIBNER.

Droseraceæ and Orchidaceæ of Spruce Pond, N. Y.—Returning home on the 7th of July, 1884, from a botanical trip to New York, Staten and Long Islands, I heard on my arrival at Middletown, N. Y.,

that *Drosera rotundifolia*, L., grew in abundance at Spruce Pond, near Southfields, a station on the Erie R. R. 25 miles east of that city. Although the time I had allotted myself for a vacation was spent, the opportunity was not to be missed, and leaving the cars I took the next returning train for Southfields. Arriving there in company with the son of my informant, the self-educated and genial botanist Isaac P. Madden, we learned that the pond lay up on the mountain about two miles south-east of the station. After a pleasant walk down the valley of the Ramapo, and a "directly heavenward" climb of nearly three-quarters of a mile, we reached the pond, a beautiful sheet of water about ten acres in extent, situated, I judge, 900 feet above the valley at this point. The entire margin of the pond is a dense growth of *Sphagnum* of the quakiest kind, a step upon the surface of which can be detected in the responsive waving of tree-tops over a hundred feet distant; this sphagnum carpet was at all points interspersed with the largest and most beautiful *Sarracenia* pitchers I ever had the pleasure of examining, while the surface of the pond itself was nearly covered with a luxuriant growth of *Nymphæa odorata*. In order to catch the returning train, I had but a short hour to spend at this arcane spot, nevertheless in the time I remained I found that *Drosera rotundifolia*, L., and *D. longifolia*, L., were really very abundant, though their flowering season in this locality was so nearly spent that only a flower or two were to be seen. Of Orchidaceæ I saw *Habenaria psycodes*, Gray, *H. hyperborea*, R. Br., *H. dilatata*, Gray, *H. blephariglottis*, Hook., and *H. lacera*, R. Br., *Calopogon pulchellus*, R. Br., *Microstylis monophyllos*, Lindl., and, in the woods near by, *Aplectrum hyemale*, Nutt. This latter plant I have found numerous specimens of at Ross Park near this city. I am informed that *Cypripedium arietinum*, R. Br., *C. candidum*, and *C. spectabile*, Swartz, have been gathered at, or near, this pond.

I know of no peat-bog near new York City that would better return an excursion of the Torrey Club in May or June, and shall visit it again (D. v.) about the middle of June next season. I hope to find it a station for many of New York's boreal species.

On the route from Middletown home, I noted from the car windows that *Baptisia tinctoria*, R. Br., though plentiful all along the road from New York, ceased entirely at about one mile east of Hancock on the Delaware; I have not seen it in Broome Co., the flora of which I hope to complete in about three years.

Binghamton, N. Y. CHAS. F. MILLSPAUGH.

Salisburia adiantifolia, Smith.—Although it has been known for several years that the ginkgo fruits abundantly each year in Central Park, yet, as a recent copy of Henderson's "Handbook of Plants" states that "there has been no fruit borne in this country," and as Josiah Hoopes in "The Book of Evergreens" does not note the fruiting of any of the trees he knows, I venture to say to all who are interested in seeing the fruit and desire to obtain specimens that they will be supplied upon application to me at the Normal College, N. Y. City.

ELIZABETH G. KNIGHT.

Cereus nycticalus, Link, or night-beauty, one of the night-flowering and but slightly fragrant species bloomed with me August 6th, and again on the 16th of the same month, when I observed that fructification had taken place in the former case. The ovary at this stage of development, when I had the whole plant photographed, was of a deep green, or, to be more exact, of a greenish-purple tint, with the scales of each spiniferous pulvillus tipped with bright pink, surrounded by white woolly hairs, and the whole capped by a persistent calyx.

The fruiting of this species, which inhabits Mexico, has not yet been reported to have taken place while in cultivation, either in this country or Europe. Five years ago I visited nearly all the public and private collections of Cactaceæ between the Atlantic coast and Mississippi River in quest of information regarding our night-flowering species, and every cultivator, amateur or botanist, met told me that this species had not been observed to perfect its berry. The same kind of information reached me from different parts of Europe, and even the late Dr. Geo. Engelmann disclaimed any knowledge of the subject referred to. All the works on Cactaceous plants, and I have consulted many, are silent on the same point, and therefore I watched with the greatest interest the progress the berry made.

My plant, a little more than thirty years old, has been in my possession for over eleven years, and flowers freely every season, late in July or August. The flower averages 10 inches in diameter and 12 in length, opens its petals about 7 o'clock, P.M., and, like its sister queen of flowers, *Cereus grandiflorus*, closes them again between the hours of two or three in the morning. There is something very fascinating about these vegetable cats and owls of Prof. Balfour; and I never before knew that some of the fruits were as short-lived as the flowers of the same. It is well known that some of the fruits of *Opuntia* and *Cereus*, when not disturbed, remain on the plants for one year.

My plant, which was out of doors when it blossomed and set its fruit, was taken back into the house on the 15th of October, and up to the 17th the berry remained of a dark green color.

Then it gradually and rapidly changed, so that by the 18th it had assumed the shade of a damson plum, light purplish-pink where exposed to the sun, and darker on the scales of the spiny cushions. October 19th the berry appeared to be of a yellowish-pink throughout its extent, and the skin in the sun-light presented a beautiful vitreous appearance, the same as in a ripe currant. October 20th the berry was pretty evenly colored with a light, delicate pink, or, in the language of the artist, Mrs. Annie N. Thomas, who made a beautiful sketch of it for me, it was of a delicate madder-pink.

The circumference of the berry around its thickest part was five and seven-eighths inches; the length, two and one-quarter inches, and diameter of the fleshy part without the spines only one inch and three-quarters; in thickness the berry measured two inches and one-quarter one way, and one and five-eighths the other. The berry had a slightly flattened shape, like that of an English walnut, the flat side, so to speak, being at a right angle with the long diameter of the stem.

By October the 25th the epidermis of the berry had wrinkled considerably, indicating over-ripeness, and had lost the beautiful pink shade, which now gave way to a yellowish tint. On the 29th it was so badly shrivelled and faded that I removed the specimen, with a portion of the stem, from the plant and placed it in glycerine, so that I might be enabled to exhibit it to the Torrey Club.

A word in regard to the fruit of the *Cereus grandiflorus*, which is as short-lived as the one under consideration. At my request, a friend sent me a berry of the *grandiflorus* from Cuba, five or six years ago. It was removed from the plant with a portion of the stem attached, before fully ripe, and was not quite six days in reaching its destination. A special messenger brought it to me on the arrival of the steamer in port. It was carefully packed in cotton and had not been handled or bruised in any way, but when I opened the package the fruit showed such evidence of decomposition that I could not have it painted. It was of a dark yellowish or chamois-color, of an ovoid shape and covered with spines, and woolly hair of a dirty yellowish shade. This fruit is edible and is sought after by man, birds and beasts.

The pulp has an aromatic flavor, and by some people the fruit is considered a delicacy when it can be obtained before the birds have feasted upon it.

The fruit of *Cereus serpentinus*, Lagasca, which is another of the night-flowering plants of the genus *Cereus*, will remain for a year on the plant if not molested. Mr. Peter B. Mead of Mamaroneck, who ripened its berry, informs me that it remained in color (which was of a deep pink) for about four months. The one which he forwarded to Dr. Engelmann was seven months old, and the doctor informed the sender that its seeds were not quite ripe within. The serpentine *Cereus* has now been fruited by Mr. Mead for three years in succession.

R. E. Kunzé.

Calendula officinalis.—I was interested last September in seeing in a dense grass-sward by the road-side near a house, the golden heads of the potherb, or golden marigold, peeping out and seeming quite at home. Of course it was an estray; but the plant was not growing in any garden near by. I dare not say it was established, though it seemed to be.

Freehold, N. J. S. Lockwood.

Shortia.—Friends of botany will be sorry to learn of the dying out of *Shortia*. In a note just received from Mr. M. E. Hyams of Statesville, N. C., he informs me that it is dying out from its only locality, not six specimens being left.

E. S. Miller.

Ilex Dahoon, Walt., var. **myrtifolia,** Chapman.—We have received a variety of this plant with yellow berries from Dr. T. F. Wood, of Wilmington, N. C., who remarks: "This is the first time I have ever seen this variety, although I had heard of its exist-

ence for a year or two. It was found within the radius of Curtis's earliest botanical field, about four miles from this place."

Ferns Wanted.—Mr. Hugo Andriessen, of Beaver, Pa., would like to exchange specimens of ferns with other collectors of these plants. A list of his desiderata will be sent upon application.

Botanical Literature.

Descriptive Catalogue of the North American Hepaticæ North of Mexico. By Lucien M. Underwood, Ph. D. Bull. Ill. State Lab. Nat. Hist., Vol. ii.

The appearance of a work on the Hepaticæ so soon after the publication of the Manual of N. A. Mosses will give students of the Bryophytes great assistance, and, with the author, we hope "that it may serve as a stimulus to more work in this direction, and lay in store material for a more critical examination of this group in the future." "No attempt has been made to publish new species, the writer believing that too many have already been described from insufficient data, and considering it far more necessary to set in order those already published." The catalogue therefore incorporates all of the work of C. F. Austin so far as accessible, Watson's MS. of Californian Hepaticæ and valuable information gained from Dr. Bolander, Prof. Forbes and others. There is a brief introduction on the characters, classification and bibliography, and three appendices on the geographical distribution, Lindberg's classification, and Dumortier's. The descriptions are very good, as is also the plan of giving references to descriptions and plates in other works, though a complete synonymy for each species would have been of great value. We note the omission throughout of the last *n* in *Jungermannia*. The author concludes as follows: "It is hoped that persons receiving this work will aid in further critical study of this group by communicating specimens of all forms found in their own localities."—E. G. KNIGHT.

Check-List of North American Gamopetalæ, 8vo, pamph., pp. 43.

Under this title, Mr. H. N. Patterson, of Oquawka, Ill., has published, in convenient form for reference, a list of all the systematic names given in Dr. Gray's recently issued Synoptical Flora. It will prove of value not only as a check-list, but also as a record of the changes that have been introduced into botanical nomenclature, for consultation by those who do not possess Dr. Gray's work.

Select Extra-Tropical Plants readily eligible for industrial Culture or Naturalization, with Indications of their Native Countries and some of their Uses. By Baron Ferd. Von Mueller, K.C.M.G. 8vo., pp. 450. Detroit: George S. Davis. 1884.

This is a work which has already appeared in Victoria, New South Wales, India, and several European countries, and which is now revised and still further augmented, for the especial use of North American readers. Its object is to bring together in condensed form, and in popular languages, data concerning the characteristics and economic uses of all the principal plants, herbaceous and arboreal, that have been found to prosper in extra-tropical countries, and to point out the particular sections to which they are adapted.

At the close of the volume are grouped together all the genera enumerated in the body of the work, according to the products that they yield, thus affording facility for tracing out any series of plants regarding which special information may be sought, or which at any time may prominently engage the attention of the cultivator, the manufacturer, or the artisan. There is also an appendix in which are brought together, in index form, the various industrial plants according to their geographic distribution, so as to render it easy to order or obtain the plants of such countries as any settlers, colonists or others may be in relation with through commercial or other intercourse.

As a work of reference, this book will prove invaluable to all who are interested in economic botany.

The Fungi of Norfolk (*Eng.*) By Chas. B. Plowright, M.R.C.S. 8vo., pamph., pp. 21.

Catalogue of the Flora of Minnesota, including its Phænogamous and Vascular Cryptogamous Plants, indigenous, naturalized and adventive. By Warren Upham. 8vo., pp. 193. Minneapolis. 1884.

The Agricultural Grasses of the United States. By Dr. Geo. Vasey. 8vo., pp. 144. With 120 plates. Washington. 1884.

Annual Report of the Public Gardens and Plantations [of Jamaica], for the year ending 30th September, 1883. By D. Morris, M.A., Director. 4to., pamph., pp. 20. Jamaica. 1884.

First Annual Report of the Agricultural Experiment Station of the University of Wisconsin, for the year 1883. 8vo., pp. 102. Madison, Wisconsin, 1884.

Philadelphia Academy of Natural Sciences.—At the November meeting of the *Botanical Section* of the Academy of Sciences of Philadelphia, Mr. F. L. Scribner read a paper entitled "Observations on the genus *Cinna*, with description of a new species. A communication from Dr. Gray, "On the movements of the androecium in the sunflower," was also read and presented for publication. In remarks relating to the subjects discussed in Dr. Gray's paper, Mr. Meehan said that at about the time of his own investigations on the sunflower and discovery of the movements of the stamens, an account of which was read at the Philadelphia meeting of the American Association for the Advancement of Science, Mr. Grant Allen was making similar although entirely independent observations on the same plant in Europe, with like conclusions. Mr. Allen's observations were published in "Knowledge," September 5th, 1884.

Mr. Martindale remarked upon his recent trip to Roan Mt., North Carolina, in company with Dr. A. Gray, Prof. John Ball and others, and spoke of the interesting botanical features of the mountain. There is little probability that the species peculiar to the locality will soon be exterminated. Botanists who contemplate visiting this mountain will be glad to learn that a railroad leading to the summit is in process of construction. This will make comparatively pleasant a journey that is now extremely tedious.

Mr. Scribner stated that the "Check-list of the North American Grasses," compiled by Dr. George Vasey and himself, and announced

nearly two years ago, was now ready for the printer. The list embraces 122 genera and 817 species and varieties, including "ballast" and other introduced species. *Hemarthria*, a species of which has recently been discovered by Dr. Havard in South-western Texas, is a new genus added to our North American flora.

Mr. Scribner exhibited specimens of *Elymus triticoides*, Nutt., and showed why he regarded this a good species distinct from *E. condensatus*, Presl., to which some recent American authors had reduced it as a variety. It is particularly well characterized by its habit of sending out stout, running rootstocks, similar to those of *Agropyrum repens*, and, like *Agropyrum*, is a great pest in moist cultivated soil. He also exhibited specimens of a *Muhlenbergia* (*M. Wrightii*, Vasey), in which many of the spikelets were two-flowered.

Proceedings of the Torrey Club.—At the regular meeting of the Club held at Columbia College Sept. 9th, Dr. O. R. Willis, in the absence of the presiding officers, was elected chairman.

Dr. Willis noted the following plants from Westchester Co.: *Potentilla fruticosa*, *Heracleum lanatum*, *Sambucus pubens*, *Taxus baccata*.

Mr. Schrenk showed specimens of *Limnanthemum lacunosum*, both dried specimens and living plants cultivated from the floating rootlets, also seeds of *Pardanthus Chinensis* exhibiting peculiar mode of germination (illustrated in August number, page 93).

At the regular meeting held Oct. 14th, the President occupied the chair and 28 persons were present. Preliminary arrangements were made for a field-day excursion on Nov. 4th to Princes Bay, S. I., in conjunction with the Natural Science Assoc. of Staten Island. Specimens of *Opuntia* were shown by Dr. Willis, both the orbicular and elongated forms (*O. vulgaris* and *O. Rafinesquii?*) Dr. Britton stated that his observations in New Jersey showed the two forms to be merely unstable varieties.

Miss Knight showed specimen of chestnut with a ripe bur and fresh catkins on the same branch, collected Sept 28th, at Alpine, N. Y.

Mr. Schrenk showed specimens of *Marsilia quadrifolia* from Bantam Lake, Conn.

Dr. Britton showed dried specimens of *Corema Conradii* from all the known localities, including the type specimen in the Torrey Herb.

Dr. Newberry gave a brief account of the botanical features of Colorado and Montana noted while on a recent trip to that region.

At the meeting of the Club held Tuesday evening, November 11th, the President occupied the chair, and 22 persons were present.

Dr. Britton called attention to a communication from Dr. Gray in regard to *Lonicera grata*. A specimen found in the herbarium of the late Mr. Leggett, collected near Flatbush jail by Mr. Ruger, was sent for identification to Dr. Gray, who decided it to be what passes for *L. grata*.

Mr. Schrenk showed specimens of *Carduus nutans* from hills back of Hoboken, where it has become well established.

Dr. Kunzé read some notes on the genus *Cereus*, with particular reference to a specimen of *L. nycticalus*, preserved in glycerine.

Dr. Britton read a paper upon the existence of a peculiar flora in the Kittatinny Mts.

At the regular meeting held at Columbia College, Tuesday evening, Dec. 9th, the President occupied the chair and 27 persons were present. Mr. Hollick showed specimens of *Mitchella repens* with leafy berries from Tottenville, S. I., where they are abundant. Reference was made to an article on the same subject in BULLETIN, Vol. x., No. 1, by W. R. Dudley, where a full description is given.

Miss Knight showed specimens of the same plant from Stowe, Vt., having the calyx-teeth developed into long bearded, petal-like parts.

Dr. Britton showed a specimen of *Botrychium matricariæfolium* from Sussex Co., N. J., a fern new to the State.

Mr. Schrenk stated that he had discovered submerged leaves in *Brasenia peltata*, a fact which is not mentioned by either Gray or Wood. They were small and thin and were not covered with gluten as are the stems and under surfaces of the floating ones.

Mr. P. H. Dudley read an account of the structure of an old railroad tie which had been in use thirty-one years on the N. Y. C. & H. R. R. R., showing photo-micrograph of the same.

Miss Knight showed fruit of *Salisburia adiantifolia* from Central Park, where it has fruited abundantly this year.

Dr. Britton read the following note on *The Northward Range of Pentstemon Digitalis*, Nutt.—This plant extends much further north than has generally been supposed. Dr. Gray in his Synoptical Flora reduces Nuttall's species to *P. lævigatus*, Solander, var. *Digitalis*, Gray, and gives its range "Virginia to Illinois and Arkansas." I have received a specimen from Mr. C. E. Smith ticketed "Tinicum, Del. Co., Penn.; this increases its range 150 miles northeastward." On June 18th of the present year Dr. H. H. Rusby and I found it growing in great profusion in a low meadow below the mouth of Van Campen's Creek, a tributary of the Delaware River, in Warren Co., N. J., and also at another place a few miles further down the Delaware Valley above the Water Gap. In these localities the plant is certainly indigenous. Dr. G. N. Best has communicated specimens from the vicinity of Rosemont, Hunterdon Co., N. J., still further down the valley, with a note reporting the species indigenous at that point. Finally, on June 21st I discovered a patch of it in a field back of Newburgh, N. Y. There were here but a few plants and they may have been introduced, though I then formed the opinion that it was native.